THE
ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXV. No. 3239 DECEMBER 22, 1939 Price SIXPENCE

Maintaining Export Trade

Scheme for Allocating Materials

WHEN we reviewed, as far as was possible, the position and prospects of electrical export trade two months ago we were able only to give a broad outline of the Government's policy as enunciated by Mr. Oliver Stanley, the President of the Board of Trade. In the meantime matters have been sorted out from the tangle which the sudden change-over from peace to war conditions engendered and more definite information is available.

Since we last wrote on the subject there have been no further additions to the list of electrical goods for which export licences are necessary and the position with regard to the issuing of licences has further eased. It is now said to be possible as a rule to obtain a licence in about three days or at the most a week. The conditions which necessitated restrictions upon the export of generating plant, transformers and switchgear have also eased and we are credibly informed that the removal of the licensing requirement in respect of these classes is being contemplated. We are also assured that although some delay is only to be expected with regard to shipping there is no serious difficulty in this direction and, once ready, consignments can be dispatched to their overseas destinations.

Rising Commodity Prices

Another matter which causes manufacturers anxiety is the possible course of prices between the presentation of a tender and the completion of a contract. In the case of heavy plant, which may take many months to put through the shops, this represents a great stumbling block. Rises in the prices of essential raw materials are inevitable in wartime and if any allowance is made for them it may put the tender out of court or, if it is insufficient, may involve the manufacturer in considerable loss.

This problem has been considered by the Government and Mr. Stanley informed the House of Commons, on December 7th, that they were "considering the possibility in appropriate cases of having some scheme which would make it possible for firms to make firm tenders and to obviate the loss of orders." Such a form of assistance, unlike many export subsidies, is economically sound when the nation is relying on overseas trade to meet in great part the cost of the war.

The principal factor in production, however, is the availability or otherwise of raw materials. It raises the threefold question of satisfying the needs of the Services, the home consumer and the exporter. Naturally the Services must come first and it is for this reason that aluminium, which in recent years has come into increasing use in the electrical industry, is not available in any quantity for other than war purposes. In other directions there is as yet no serious shortage. The problem is one of directing materials in the proper proportions into the three channels mentioned. Linked up with this is the necessity that manufacturers quoting for overseas contracts shall be certain that if they are successful the necessary materials will be obtainable. The Government has under consideration plans for guaranteeing that this will be the case.

Co-operation with Industry

In October the President of the Board of Trade asked some of the principal manufacturers' and exporters' organisations for their co-operation in the distribution of essential supplies for the production of goods for export. It was felt that a satisfactory flow of such materials could better be obtained by allocating aggregate quantities to groups than by dealing with individual manufacturers and for this purpose it was obviously necessary to secure the aid of existing trade organisations.

Consequently these organisations were asked to furnish information as to the approximate proportion of their members' production normally devoted to export; the total export output of the whole industry, whether or not members of the organisation; the prospects for the industry's export trade in the next twelve months: and the approximate quantities of specified materials required to achieve this export trade. They were also asked what steps could be taken to ensure that allocated materials would be used solely for export production and whether any special difficulties with regard to export trade were anticipated.

So far as the electrical industry is concerned the principal materials of which there may be a shortage are steel and copper, commodities which bulk largely in the heavier products and in cable making (which absorbs over 70 per cent. of the copper). The principal electrical manufacturers' organisations are being taken into consultation with a view

to the formulation of plans for allocating these materials. Useful contributions to the discussions have been made by B.E.A.M.A. in the form of a statement of materials used in various branches of electrical manufacture and a "conspectus" of electrical export trade in 1938 ranging from heavy plant to instruments, but not including water-tube boilers and boiler-house equipment. This analyses the total value of exports during the year of £23 million under thirty-six heads and shows the degree of organisation existing in each branch of the industry. It is to be hoped that this collaboration between the industry and the Government will do much to ease the path of the electrical manufacturers and justify itself by helping to maintain electrical export trade at a satisfactory level.

Glasgow and E.D.A.

FROM Glasgow comes the unwelcome news that the Corporation has decided to withdraw from membership of the British Electrical Development Association. This has nothing to do with the war, for the matter has been trembling in the balance for some months. The last reported step was that the existing Electricity Committee had decided to leave the decision to the new Committee appointed in November. The monetary loss to E.D.A. is, of course, substantial (about £1,400 a year) but we fear that the moral effect upon other undertakings may be worse in the present circumstances. We are glad to hear that so far there has been very little tendency upon the part of municipal undertakings to contemplate withdrawal from membership. As we said when the matter was under consideration earlier in the year, Glasgow should realise that its E.D.A. subscription is money well spent. At present, of course, the Association's publicity activities are restricted but it performs a number of other useful services to its members which are being continued. In any event E.D.A. must be kept alive; its many years' of experience must not be thrown away for the sake of a few hundred pounds.

Fluorescent Lighting

THE question of the possibility of eyesight trouble through the use of "black light" is raised by Mr. E. Shurley, president of the Master Sign Makers' Association, in a letter to the *Advertisers' Weekly*. He instances the discontinuation of its use in the entrance hall of a cinema on account of ill effects on the staff and public which were attributed to its rays. It seems at least probable that other causes were at work, however badly the lamps may have been placed. The light emitted by black lamps has a wavelength of as long as 3,650 Au, which has hitherto been held to have none of the dangerous properties of the shorter wavelengths usually known as "ultra violet." Discussing this point in our issue of August 25th, Mr. R. H. Finch stated, as the result of experience gained by a leading firm which has installed "black light" in many factories, that no single instance of ill-effects on operatives had occurred. Included in the applications were invisible fluorescent laundry marking systems, which would appear to provide a particularly strenuous test.

I.E.E. Benevolence

LAST year, the then President of the Institution of Electrical Engineers (Dr. A. P. M. Fleming) made a special appeal to members to wipe out the deficit in the Benevolent Fund. This was done, but it is not enough. The real need, as Mr. Johnstone Wright, the new President, points out in his appeal, is to secure continued support, and this need is likely to become greater in the future. The subscription list for 1939 includes the names of less than one-third of the membership, and barely a half of these are regular annual contributors, through the trouble-saving medium of a banker's order or otherwise. In the coming year the fund will be without the substantial aid that was forthcoming from the proceeds of the Electrical Engineers' Ball and of sports and social functions in the local centres. If the other two-thirds of the membership agreed to make a regular annual payment on the same scale as the average of the existing contributors, the yearly income of the fund would amount to well over £13,000. Even if new subscribers paid only the average amount now received per member of the Institution, viz., 4s. 6d. per head, the income would be raised from £4,400 to £7,500.

Artificial Starlight

THOUGH coming too late to be of any value during the busy Christmas shopping period, the announcement that a modified form of street lighting is to be permitted will, no doubt, be welcomed by everyone. "Comfort" lighting it has been called, but one must not be misled by the title. Actually it has been described as a compromise between the maximum invisible from the air and the minimum of any practical value. It does, however, at any rate enable pedestrians to avoid such obstacles as sandbags and lamp-posts, but they must not be lulled into any sense of false security by thinking that motorists can see them any better. The lighting will, however, not be of such intensity as to make this likely, for it is aptly likened to bright starlight. The intensity of 0.0002-ft. candles specified is lower than anything thought possible a few months ago, and appears almost fantastic when it is considered that before the war the Home Office recommended 500 times this amount (0.1-f.c.) as the minimum illumination for open yards, passages, roadways, &c., in factories.

Reading Approves

FROM a report which recently came before the Reading Town Council it is evident that the trolley-bus system inaugurated last May has proved an outstanding success. The popularity of the service has been such that, even with the shorter headway made possible by this particular form of transport, it is reported that a system of orderly queueing may be advisible at certain places, an expedient which apparently has not hitherto been considered necessary. In the first half of the current financial year the transport undertaking has earned a surplus of £5,578 compared with £1,892 in the same period of 1938, so that the two cardinal requirements of a good system are fulfilled, namely, sound finance and popular approval. Had the Council chosen the alternative of motor-buses it is improbable that under the present difficult circumstances the public would be so well served.

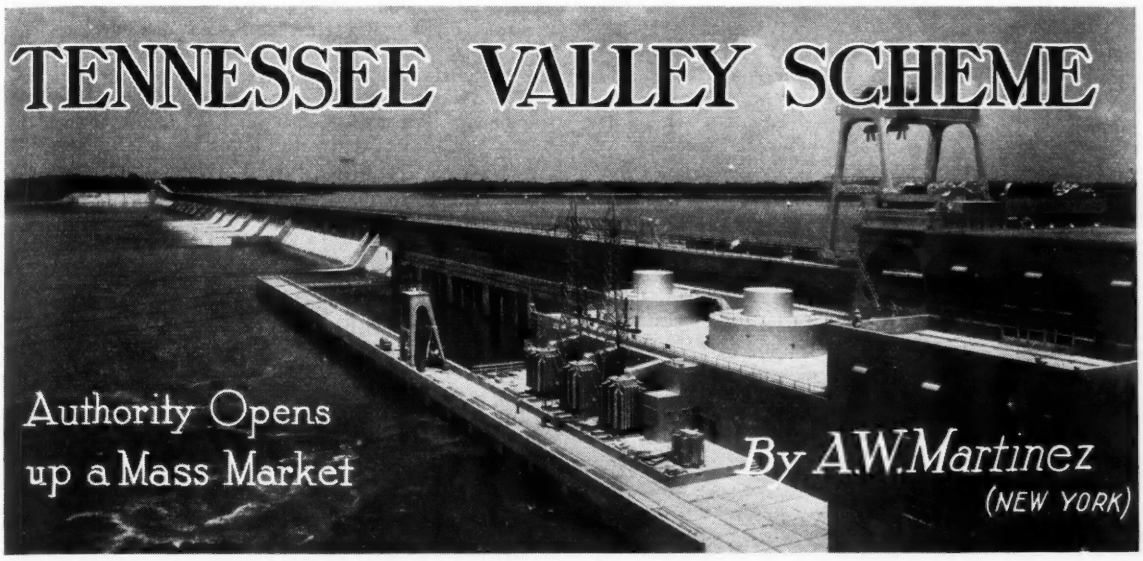
Adjustment of Charges

RISING production costs inevitably mean higher charges whether it is here or in the United States. In that country during the last war there was an embarrassing lag between the two and it is to avoid a repetition of this that Mr. C. W. Kellogg, President of the Edison Electric Institute, propounds a scheme in the *Electrical World* for the automatic adjustment of charges. His proposal is that four "benchmarks" for 1937 shall be the datum level:—Cost of fuel per kWh; payroll and other operation costs per kWh; taxes; and retirement appropriations (depreciation and sinking funds). For a certain percentage rise or fall in these items, taken over a twelve-month period, he suggests a proportional increase or decrease in charges for electricity in the form of surcharges or rebates on the consumers' bills. Mr. Kellogg prefers this method as its employment makes it unnecessary to disturb existing tariff structures. A precedent exists for this system, for something of the kind was put into force in France in 1916.

A Regular Supply

AT the risk of becoming tedious we once again recommend readers to make sure that they obtain their ELECTRICAL REVIEW regularly by requesting their newsagent or bookstall to reserve them a copy. This, as we have explained before, is to the advantage of all concerned: the reader himself; the newsagent who is thus enabled to know how many copies to order and is not bothered by "returns"; our Publishing Department which can gauge more accurately the number required to be printed; and the nation which conserves paper when there is no overprinting of copies.

TENNESSEE VALLEY SCHEME



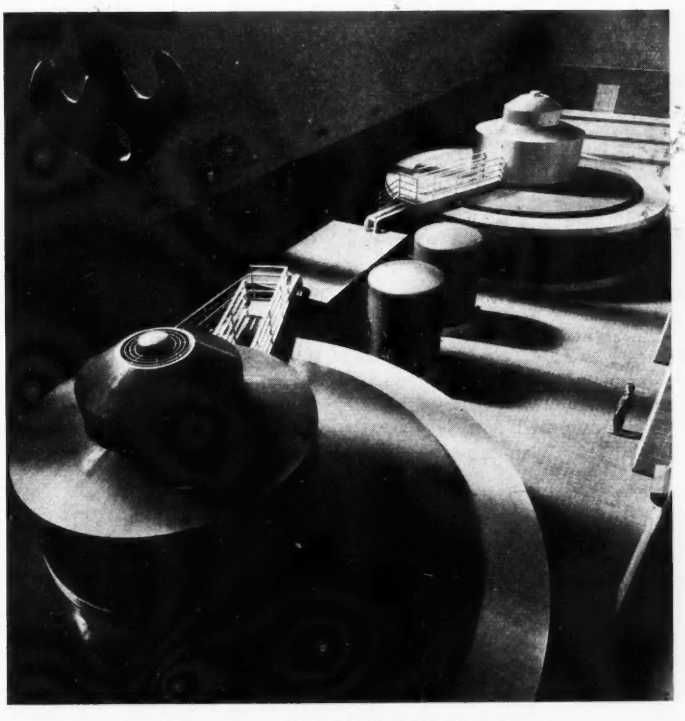
Authority Opens up a Mass Market

By A.W.Martinez (NEW YORK)

CHEAP electricity has brought the use of larger electrical appliances, such as refrigerators and ranges, within the economic reach of tens of thousands of Americans living in the cities and on the farms of the Tennessee Valley, in the South Central part of the United States. Hundreds of rural communities which had never before enjoyed electricity now receive it from the Tennessee Valley Authority, the agency set up by the Government in 1933 for the harnessing of the unruly Tennessee River.

Of the four dams now in operation, one (the Wilson Dam at Muscle Shoals) was erected by the Government during the last war for the electrical fixation of nitrogen for the manufacture of munitions. The whole project has, in fact, as one of its underlying reasons for being, the national defence. Far from the coasts and the borders, this inland valley is a natural stronghold in which war materials could be produced far from the reach of any invader.

It would be a mistake to presume, however, that this motive overshadows the others in T.V.A.'s integrated plan for the Valley: Flood control, deep-water navigation, soil rehabilitation, and hydro-electricity. When the ten dams projected for the Tennessee Valley by the T.V.A. are completed several years hence, floods which are now so ruinous to the Valley's cities and farmlands will be stored behind high dams, to be released after each danger period. A new, deep channel is expanding the river's limited, short-haul navigation into inter-territorial transportation, increasing the Valley's water-borne traffic to the Mississippi and Ohio Rivers. Concentrated fertilisers, including phosphates and nitrates, are being manufactured with T.V.A. electricity, to restore an eroded and exhausted soil. And finally, cheap electricity in scores of the Valley's townships and hundreds of its farms, is reducing the farmer's discomfort and drudgery and enabling him to raise more and better crops.



Turbine house of one of the T.V.A. projects

Electricity going to these towns and farms from the four dams now completed (Norris, Wheeler, Wilson and Pickwick) comes from generating equipment which has an installed capacity of 420,000 kW. The peak load reached in 1938 was 253,000 kW. When completed, the ten dams of the T.V.A. will have equipment with an installed capacity of 1,401,500 kW, with a dependable capacity on peak load of 1,180,000 kW. The T.V.A.'s dams, when taken all together, are comparable in magnitude with the Great Boulder Dam in Colorado, the initial capacity of which is 535,000 kW, and which will ultimately have 1,317,500 kW of plant installed. The ultimate costs of the two projects, however, are widely different, that for the Boulder Dam being $108,800,000, and that for the ten T.V.A. dams, with their integrated projects, $505,307,622.

The revenue derived from the sale of power by the Tennessee Valley Authority at the close of the 1937-38 fiscal year was $1,888,000 for 1,427,928,442 kWh.

Both of these Government projects are said to be self-liquidating, with the T.V.A. paying for itself in thirty years and the Boulder Dam in fifty. Costs for power houses and equipment at the Norris, Wheeler, and Pickwick Dams averaged $50.56 per kW of installed capacity—considerably less than the average cost of $58.34 reported for four comparable private developments.

How cheap is the electricity going to the 145,000 customers served by power from T.V.A. dams? The average price reported for 1937-38 by the 61 municipalities and co-operatives which buy and distribute T.V.A. power is 1.99 cents per kWh. The nation's average electrical customer pays 4.40 cents per kWh. At this low rate, the average domestic consumer in the Valley can well afford to buy 1,270 kWh per year—58 per cent. more than the national average for domestic consumption. And since he is constantly buying new electrical equipment better to take advantage of this cheap power, his consumption of it was 9 per cent. above the previous year of 1937. His purchases of electrical equipment as reported for the fiscal year 1937-38 were phenomenally large—$54 per head, according to the 400 dealers who reported sales totalling $1,612,000 of electrical appliances to domestic customers of municipalities and co-operatives distributing T.V.A. power. And the number of customers has since grown from 42,188 to 145,000 or more.

Many of these customers for electrical goods purchased major appliances, such as refrigerators and ranges, for the first time. About 60 per cent. of the residential customers using T.V.A. power at the end of the year had electric refrigerators, compared with less than 50 per cent. for the nation. Electric ranges were owned by 23 per cent., compared with less than 9 per cent. of the whole nation. The increased sale of power resulting from the use of these appliances is estimated to exceed 9,500,000 kWh annually, equalling the combined residential, commercial, and industrial use of electricity in Tulepo, Miss., in 1938. Comparison is made with Tulepo because this was the first municipality through which T.V.A. electricity was sold, at the start of the T.V.A. programme.

Was cheap electricity the only factor in the phenomenal increase in consumers? According to T.V.A. officials, two other factors have also operated: Sales through municipalities and co-operative associations, rather than through private utilities; and an extensive promotional and educational programme. The first factor is the subject of much heated controversy and lawsuits on the part of some of the private utilities; it is not our purpose to discuss it here. The second is an unquestioned and splendid fact, and in the long run may prove to be one of the greatest contributions made by the T.V.A. towards raising the standard of living in the Valley.

The Act of Congress creating the T.V.A. specifies that domestic and rural consumers are to be considered preferred customers and provides for sales to industry "as a secondary purpose, to be utilised principally to secure a sufficiently high load factor and revenue returns which will permit domestic and rural use at the lowest possible rates." Hence it was natural that the Authority should try to promote mass consumption, to lower the unit cost of distribution. Needless to say, the cost of delivering 250 kWh to a customer is little more than that of delivering 50 or 100 kWh.

Under the T.V.A. Act, municipalities and co-operative associations are preferred customers. These bodies increased their purchases by 48 per cent. in 1937-38, revenue from this source rising from $369,000 to $545,000. The increase resulted partly from the addition to ten new local distributing systems and partly from the expanding demands of the thirty municipalities and associations previously served. More than 45 per cent. of the primary or continuous power (the only type of power usable for retail distribution) produced in the fiscal year 1937-38 went to such municipalities and associations. According to T.V.A. spokesmen, this trend away from distribution by private utilities can be expected to continue.

Until the Authority took over the Wilson Dam, none of the power generated there had been made available to public agencies. The development of this market, according to the Authority, has necessarily been slow because of the time required for the negotiation of contracts, acquisition of distribution systems by local agencies, and extension of suitable transmission facilities, as well as because of hampering legislation.

Control room at the Wheeler Dam plant

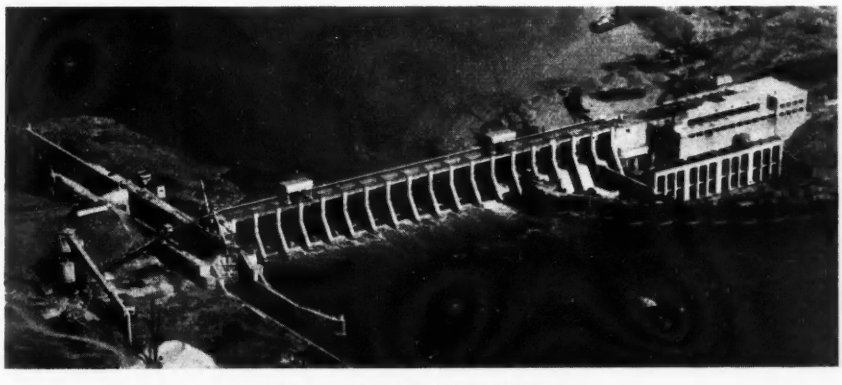
Sales to industry and to private utilities, made in accordance with the policy mentioned above, totalled 407,168,000 kWh during the fiscal year 1937-38. Of this, 111,153,000 kWh was primary power; 296,015,000 kWh was secondary and interruptible. The latter power, though useless for retail distribution, may be used in many industrial operations. Among those buying this power were the Aluminum Company of America, the Victor Chemical Works, and the Monsanto Chemical Company. In bargaining with industry and private utilities, as well as in serving communities, the T.V.A. can and does improve its circumstances by adding to its own high-voltage transmission lines, 385 miles of which were placed in service during the 1937-38 fiscal year, bringing the total to 1,422 miles.

That this service to individual communities is being cultivated to the full extent of its possibilities is evidenced by the remarkable amount of electrical machinery developed by the Authority's engineers especially for the use of the farmer. Small or large, these devices all make for increased electrical consumption and decreased drudgery on the part of the farmer.

Among these devices are an electrical feed grinder that operates without constant attendance (this device is now being manufactured and sold by a southern concern); a barn hay drier which can be built at low cost on a small farm; a new tobacco-curing barn, in which electric fans are used to help in controlling temperature, humidity, and carbon dioxide accumulation, and which has been found to improve the quality of the tobacco and prevent losses; electric insect traps, for use by tomato growers, which have been proved very effective; a quick-freezing machine and process for small fruits and vegetables, enabling the farmer to preserve his produce with all its natural flavour, so that he can command better prices in a market less governed by the seasons; and community refrigerators in which several farm families can store their meat and other farm produce. The above list does not include two industrial electrical processes for producing agricultural phosphates, developed after four years of research by T.V.A. engineers.

The ultimate significance of the quick-freezing of the farmer's produce may be for him the difference between want and plenty. Anyone who has followed the startling growth of the quick-frozen food industry in the United States during the past two years knows that large fortunes are being made from it, and that the farmer is by no means the least of the beneficiaries. The experiments by the T.V.A. at the University of Tennessee Engineering Experiment Station were sound, thorough pioneering work, adapting the equipment of a potentially great industry to local products and conditions. Tested on a semi-commercial scale, the T.V.A.'s quick-freezing machine froze 53,000 lb. of strawberries, 54,000 lb. of youngberries, and 8,300 lb. of peaches in the spring and summer of 1937. When this produce was sold in St. Louis and in New York, the strawberries particularly were found to command premium prices because of their flavour, texture, and appearance. In the 1938 season approximately 88,000 lb. of strawberries and 20,000 lb. of youngberries were quick-frozen. In addition, 61,000 lb. of strawberries were sliced and cold packed. Peaches and cherries were also frozen.

Of equal interest to the dealer in electrical equipment is the farmer's experience with low-cost community refrigeration. Developed by the T.V.A. engineers, the refrigerator used by one community cost $650, and is said to have saved farmers $476 the first year. Deducting operating cost, interest on the investment, and depreciation, the farmers' net saving for the year was $300, with the refrigerator operating at only 50 per cent. of its capacity. Eleven were used by more than 250 farm families in 1937.



Plant at Guntersville, Alabama

Of no less benefit to the farmer than quick-freezing and community refrigeration are the two industrial electrical methods for producing phosphates, mentioned above. Phosphorus, which is removed from the soil when the crops are harvested, must be replaced or the soil will become exhausted. The two electrical processes developed after four years' research by T.V.A. engineers, both leading to a concentrated superphosphate of calcium, are: (1) A process giving 45 per cent. of available plant food; (2) a process giving 63 per cent. of available plant food.

Norris Dam

The first process substitutes electrical energy for the valuable sulphuric acid heretofore used in commercial practice. The first part of the process consists of heating rock phosphate with coke and silica pebble in an electric furnace. The furnace gives off carbon monoxide and elemental phosphorus in gaseous form, leaving calcium silicate slag, which can be used for concrete or blown into rock wool. The carbon monoxide gas is used as fuel in a kiln for treating the crude phosphate ore, which comes from the mine as a yellow mud. The mud is dried and melted into a porous sinter suitable for charging into the electric furnace. The phosphorus gas can be condensed into yellow phosphorus, which is an important industrial and military material. In making fertiliser, the phosphorus is burned with water to make phosphoric acid. This acid is combined with rock phosphate to give the triple superphosphate which is the product ready for use on the land.

In the second process, yielding 63 per cent. of plant food, the carbon monoxide and phosphorus gas are burned and the hot gases passed into a tower containing lumps of rock phosphate. The burned phosphorus combines directly with the rock, making calcium metaphosphate, commonly called "metaphos." This metaphos drips off and runs out at the bottom of the tower, where it hardens into a cake.

The research and ingenuity that produced the foregoing processes and devices are not things whose usefulness is confined to the Tennessee Valley alone. All the world may profit by them.

ELECTRICITY IN SHIPS

Revised I.E.E. Regulations

By A. Regnauld, B.Sc., A.R.C.Sc., M.I.E.E.

BECAUSE the British marine engineer has not, generally speaking, been very favourably disposed towards the use of electricity for propulsion purposes, we are rather prone to lose sight of the very important part which electricity plays in the economy of all types of ships. That impression receives a certain amount of justification from the fact that it was not until 1919 that the Institution of Electrical Engineers deemed it necessary to issue any official regulations governing the manufacture and installation of electrical equipment for use on board ship.

Actually, it was in May, 1916, that the "Ship Electrical Equipment Committee" was set up with the idea of promoting uniformity of practice and the standardisation of cables, accessories and apparatus, but, owing no doubt to the exigencies of the time, it was not until some three years later that the first edition of the "Regulations for the Electrical Equipment of Ships" was published.

A second edition was issued in 1926, although the compilers admitted that during the seven years since the publication of the first edition few developments of a radical nature had taken place. However, the third edition of the Regulations which has just appeared* contains evidence of the many substantial developments which have taken place during the past fifteen years in the use of electricity on board ship.

A very good idea of the ever-increasing importance of electricity in marine engineering practice over the period covered by the I.E.E. Regulations can be gathered from a comparison of the electrical equipment of the former White Star liner *Olympic* of 45,000 tons gross which can be considered as exemplifying the latest practice in the luxury liner of the pre-1914 period—with that of the new Cunard White Star liner *Mauretania* of 35,740 tons gross, which is representative of liner practice of the present day.

The main generating plant of the former comprised four 400-kW generators, each driven by a three-crank compound reciprocating steam engine at 325 RPM, the voltage of the supply being 100. In the latter vessel there are also four generator sets but these are of 800-kW capacity and each is driven by a steam turbine through gearing, the supply voltage being 220, DC being employed in both instances.

Latest Examples

In the *Queen Mary* there are seven 1,300-kW geared turbine-driven sets also generating at 220 V DC, while in the *Normandie*, a liner very similar in general dimensions to the *Queen Mary*, in addition to the auxiliary electrical installation comparable with that of the British vessel, there is the electrical equipment for propulsion aggregating something in the region of 120,000 kW.

In cargo ships, which constitute the bulk of the world's merchant tonnage, the same rapid growth has occurred. In particular, the wide adoption of the Diesel engine as a means of propulsion has led to the almost universal use of the electric motor for driving the pumps, the winches and so on, so that to-day electricity finds a very extensive application in almost all types of ship both for power and lighting purposes, while for cooking and heating it is also being increasingly adopted.

The difficult conditions met with in ships call for the most meticulous care not only in the design and manufacture of the equipment but also in its installation, in order that it shall be capable of withstanding the corrosive action of the sea atmosphere to which it is continuously subjected as well as the risk of short circuits and "earths" on the steel hull of the ship.

The "Regulations for the Electrical Equipment of Ships" cover the main requirements which must be satisfied as well as the precautions to be observed in order to ensure satisfactory results—including safety from fire and shock—in the generation, distribution and utilisation of electrical energy for all purposes in sea-going ships of all descriptions except ships of war, and a study of this new edition in comparison with the previous one is a forceful reminder of the extent to which the problem has grown in recent years. Thus, while the second edition comprised only 116 small octavo pages, the new edition has expanded to 174 pages of somewhat larger size and many entirely new sections have had to be included.

The Regulations comprise a preliminary section containing a series of definitions—in the new edition these are arranged alphabetically—covering the various terms used. This is followed by a number of sections dealing with the nature of the supply, the generating plant, the switchboard, the transmission cables and so on right down to the smallest detail of the bell and indicator circuits. In the new edition the same general scheme is followed, but many of the sections included in the second edition have been improved out of all knowledge while a number of new ones have been added.

As an example of the principal changes made, the section dealing with cables can be cited. Here the regulations have been tightened up to meet the general increase in voltage, which is a feature of modern marine electrical practice, since this obviously increases the risk of breakdown. Moreover, the not inconsiderable number of fires on shipboard which have been attributed to failure of some part of the electrical installation have been responsible for considerable attention being given to the design and lay-out of the transmission system. Thus, the minimum size of conductors for fixed wiring has been increased and new rules have been laid down governing the nature of the insulation covering the conductor. Where bare conductors are used (as, for example, behind switchboards) these must comply with the British Standard Specification except that aluminium must not be employed.

Standard Specifications

Throughout the "Regulations" the appropriate B.S.S. are adopted and some sixty of these referred to in the text are listed with the official specification number in an appendix. One section governs the trials of the electrical equipment on board ship, these trials being additional to the acceptance trials of the individual items of plant at the makers' works. This section has been greatly extended and covers tests for insulation resistance to earth and between conductors as well as tests for performance, temperature rise of machines, etc.

Among the new sections, one which merits special mention is that dealing with electrical propulsion plant. This comprises no fewer than twenty pages and contains regulations covering both the steam turbine and the heavy-oil engine as the prime movers for driving the electric generators. The use of AC, which is generally employed in large vessels using the turbo-electric system, as well as DC, which is usually associated with the Diesel-electric system, are dealt with and remote control as, for example, from the bridge in addition to the more normal method of engine room control is also covered.

Other new sections relate to electric signs and luminous discharge tubes which, of course, can almost be regarded as novelties introduced during the past decade. The extended use of electricity on board ship taken in conjunction with the growing importance and increased delicacy of the wireless equipment is responsible for the inclusion of a special appendix dealing with the suppression of electrical interference. In addition to the usual tests, all radio equipment including direction-finding and depth-sounding gear as well as broadcasting apparatus, if any, must be tested for the purpose of detecting interference from the ship's electrical installation.

From the foregoing summary it will be realised that these Regulations, while not intended to take the place of a detailed specification, furnish much valuable and precise information governing the construction and fitting of every kind of electrical equipment which is to be found in modern ships. Each regulation is given a separate number and a concise index containing some 500 references and cross references enables any item to be found with the minimum of trouble.

Lloyd's Rules

It may be noted in conclusion that, as already stated in the ELECTRICAL REVIEW, Lloyd's Register of Shipping, which together with the British Admiralty and the other classification societies has participated in the work of the I.E.E. Ship Electrical Equipment Committee, has also issued a new set of rules under the title "Rules for Electrical Propelling Machinery and Rules for Electrical Equipment."† These rules, which must be fulfilled in the case of all vessels classified in Lloyd's Register, are in close agreement with the Regulations of the Institution of Electrical Engineers. Lloyd's rules give a precise statement of what is essential in all the electrical equipment fitted in a ship; the I.E.E. regulations may be said to indicate how those essential requirements can be achieved.

* E. & F. N. Spon, Ltd., or from the Institution of Electrical Engineers. Price 3s. (cloth) or 2s. (paper covers).

† Issued by the Committee of Lloyd's Register.

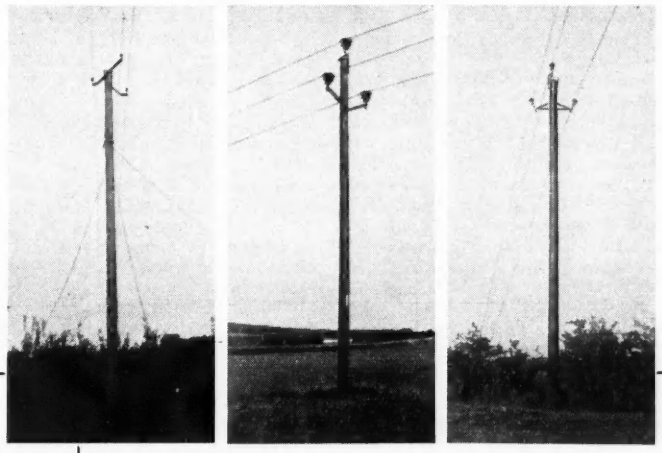
HIGH-VOLTAGE CONDUCTORS

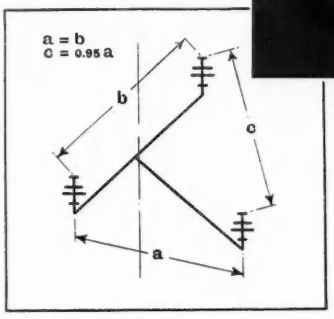
Considerations Affecting their Arrangement

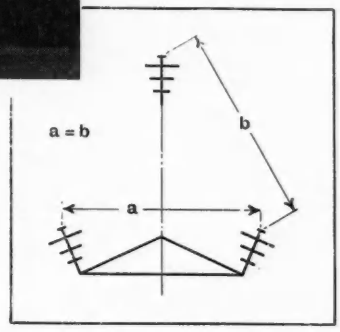
By J. McCombe, Ph.D., A.R.T.C., A.M.I.E.E.

THERE is a tendency to treat the spacing and arrangement of high-voltage conductors from a purely mechanical aspect. This is not strictly correct as certain electrical factors such as corona and induction must be taken into account, but in most cases the spacing necessary to meet the mechanical conditions automatically suits the electrical considerations.

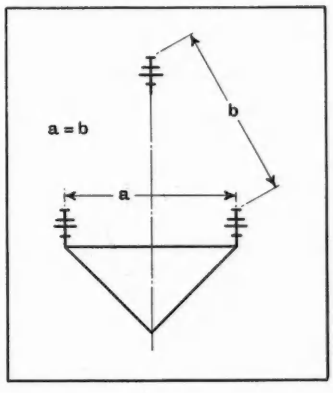
When the voltage between the conductors of an overhead transmission line exceeds the visual critical voltage of the line, the air surrounding the conductors breaks down under electrical stress, and an annular glow or corona surrounds the conductors.







Left (photo. and diagram) : Unbalanced triangular arrangement of conductors. Centre and below : Conductors in symmetrical delta formation. Right : Form of symmetrical delta spacing that enables shorter steelwork to be used

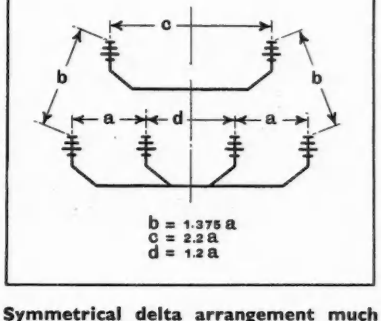


In effect, the air surrounding the conductor has become temporarily part of it, and this is equivalent to increasing its size. If the spacing is too close (less than approximately fifteen times the conductor diameter) the corona may bridge the gap between conductors and flash over.

Increased spacing, however, not only prevents this but also prevents corona since it raises the critical voltage, which is also increased by the use of larger diameter conductors.

At the same time, increased spacing means increased reactance. For example, a standard hard drawn 0.1 sq. in. (7/.136) copper conductor has a reactance of 0.450 ohm per mile at a frequency of 50 cycles when the spacing is 12 in. If the spacing is increased to 3 ft. the reactance increases to 0.56 ohm and at 6 ft. it becomes 0.63 ohm per mile, causing increased voltage drop and consequent power losses.

Apart from mechanical considerations, therefore, the spacing should be such as to give a good critical voltage value for the line but at the same time to reduce the induction losses to a minimum. In determining the spacing to suit the mechanical requirements the following points should be considered : Clearance between conductor and pole or iron work; spacing between conductors; maximum spans; maximum sag on maximum span at worst load conditions of wind and ice at 22 deg. F. The clearance between the conductors and the pole or iron work should be such that a large bird sitting on the conductors would not cause an earth fault when spreading its wings to take flight. The following minimum clearances are good averages for British practice : 11 kV, 12 in.; 33 kV, 15 in.; 66 kV, 30 in. When suspension insulators are employed the horizontal displacement of the suspension set should be added to the above figure in order to allow for the swing from the vertical.



Symmetrical delta arrangement much favoured for double-circuit lines

The closer the conductors are together, the more economical is the construction since shorter poles and lighter fittings can be used. Alternatively, longer spans can be employed with standard poles. The sag on the maximum span for worst load conditions is calculated on the assumptions laid down in the Electricity Commissioners Regulations of $\frac{3}{4}$ in. thick radial ice and a gale of fifty miles an hour, which produces a wind pressure of 8 lb. per sq. ft. on the conductor.

The sag so calculated will not be vertical but will assume a position according to the ratio of the windage and weight of the conductor. The distance or horizontal displacement that the conductors assume when ice loaded in a fifty-mile gale can be easily calculated. The smaller and lighter a conductor is the greater will be the required horizontal spacing, since the ratio of wind to weight is greater than with a heavier conductor and hence a greater swing or horizontal displacement results.

As an example, a 7/12 steel conductor with a diameter of 0.312 in. weighs 0.207 lb. per ft. run and 0.577 lb. when ice loaded; the windage per ft. run is 0.708 lb. and the angle of swing from the vertical 53 deg. 17 min. On the other hand, a steel-cored copper conductor with a diameter of 0.384 in. weighs 0.357 lb. per ft. run and 0.71 lb. when ice loaded; the windage per ft. run is 0.756 lb. and the angle of swing from the vertical is 47 deg.

Having determined the horizontal displacement on the maximum span at worst load conditions of wind and ice, the following empirical rule may be applied :— The *minimum* horizontal spacing should not be less than *half the maximum* swing of the conductors from the vertical on the maximum span at worst load conditions. The following spacings are representative of modern British practice : 11 kV, 3 ft.; 33 kV, 3 ft. 6 in. to 4 ft. 6 in.; 66 kV, 6 ft.; 132 kV, 9 ft.

Unfortunately, there is no definite mathematical formula available for the determination of the actual spacing of overhead line conductors. Many rules have

been reduced to an empirical form. Their application, however, to any particular spacing problem gives such varying results that they tend to confuse rather than help the engineer.

There is no hard and fast rule regarding conductor arrangement. Some engineers favour the unbalanced triangular arrangement. In general practice, however, the symmetrical delta arrangement is the most popular for voltages up to 66 kV. It has many advantages as it lends itself to easy adoption for angle positions up to 20 deg. with small constructional alteration. Furthermore, at medium heavy-angle or terminal positions where suspension or tension insulators are employed for mechanical reasons, the transposition from the symmetrical delta to the vertical or flat horizontal is simple and involves no sacrifice of conductor spacing.

In unsymmetrical arrangements a transposition of the phasing is carried out at regular intervals in order to balance the electrical characteristics of the various phase sand to prevent inductive interference with parallel telephone circuits, but this is not necessary with the symmetrical delta arrangement.

Vertical-conductor arrangement is sometimes used for double-circuit construction, but is not generally favoured as it means taller poles. Difficulty is also experienced during snow-storms, as when a lower conductor loses its ice loading it may whip up and come into contact with the one above which is still wholly or partially loaded and cause a phase-to-phase fault.

My thanks are due to H. M. Speirs & Co., Glasgow, in regard to the drawings illustrating this article.

Electricity in Spanish Morocco

From a Correspondent

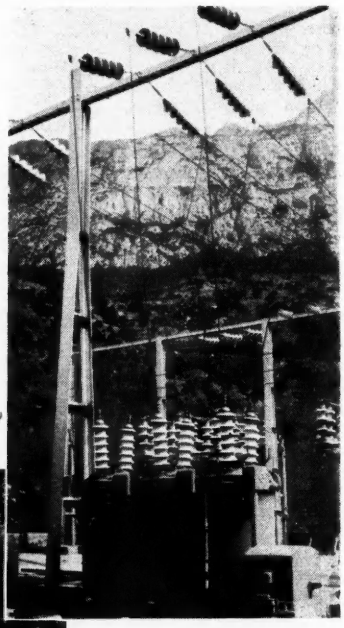
TANGIER, the gateway to Spanish Morocco, became a British possession when it was handed over as part of the dowry of Catherine of Braganza (Portugal) when she married Charles II. It was given up in 1684 and is now an international settlement. The population is approximately 50,000 and there is a small hinterland of about 144 square miles covering the extreme north-west corner of Africa. The area is bounded on the east and south by Spanish Morocco and the chief towns there are Tetuan, Ceuta, and Larache. These towns, together with Tangier, are supplied with electricity from the Oued-el-law hydro-electric scheme.

Through the courtesy of Don Jaoquin Del Castillo, the secretary to the Spanish Consul-General at Tangier, I recently had the pleasure of seeing over this hydro-electric scheme. I was accompanied by four friends; one, an American lady who speaks Spanish fluently, was most helpful. Armed with the necessary permits we travelled by car from Tangier to Tetuan, about 50 km. distant, and were received at the offices of the Electras Morroguies (S.A.) by Senor Juan Pablo Molina, technical director. After visiting the main receiving and distributing station at Tetuan we proceeded 57 km. by car through some interesting and beautiful country to inspect the hydro-electric scheme. We were met there by Senor Jose Agcoitia Soraluce, a Basque engineer who is in charge of the works.

At Alitilat, a dam 20 metres high and 500 metres long has been built to hold up 20 million cubic metres of water during the rainy season—from November to April—to meet the electricity requirements of the territory during the six dry months. The average annual rainfall is 600 mm. The head race, consisting of a canal with five tunnels and one syphon totalling 7 km. in length, is in beautiful but extremely rough country.

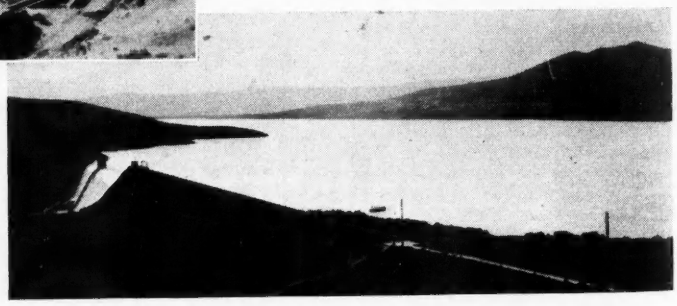
The canal runs close to the village of Abdul Krim, the famous Riff leader, and when we approached that stronghold an armed Moor stepped into the road and asked our business, but he was soon reassured and apologised for troubling us.

A single pipe line 1.8 metres in diameter conveys the water down a steep hillside to the generating station giving a head of 120 metres. The station is a well-constructed stone building and the initial installation consists of two Escher-Wyss vertical turbines each coupled to 4,350-kVA, 6-kV, 750-RPM, 50-cycle Oerlikon generator and accommodation is provided for two additional sets. The generators are coupled direct to transformers which raise the pressure to 66 kV for transmission to Tetuan, where the supply to Tangier (50 km.), Ceuta (45 km.) and Larache (112 km.) is controlled. For local distribution the intermediate pressure is 2,000 V and the low-pressure supply 3-phase, 4-wire 110/190 V. In 1938 the maximum demand on the system was 4,800 kW and the output 14 million kWh.



Step-up transformers (6.6/66kV) at the generating station. Left: The power station

The civil works, the plant, switchgear and transmission line construction have all been carried out in accordance with best modern practice and reflect great credit on the Spanish engineers who were responsible for this pioneer installation.



Reconstruction of the canal was necessitated by a landslide. In this picture the 66-kV transmission line is seen in the background. Right: View of the Alitilat dam and lake from the Guest House

At the conclusion of our visit, we were taken to the company's guest house (from which a fine view of the headworks is obtained) where we were most hospitably entertained, after which we left for Tangier with a very friendly feeling towards our Spanish hosts.

PAPER MANUFACTURE

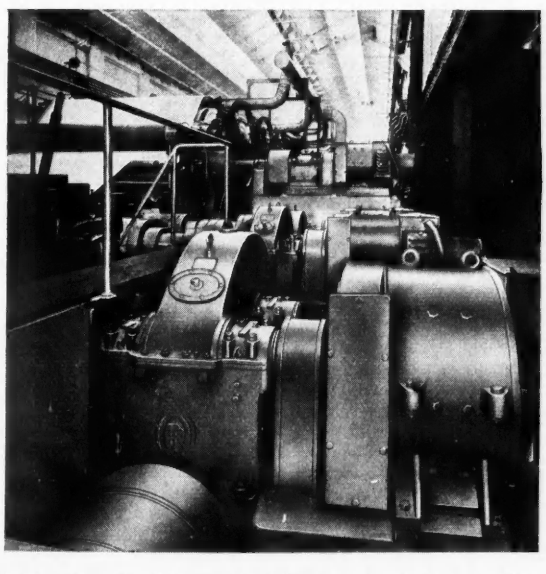
Sectional Unit Drive at Dartford Mills

THE most difficult problem encountered in employing electric motors in paper mills, perhaps, is the drive of the paper-making machine itself. This is complicated by factors such as the necessity of combining constant tension between sections with full control of the machine speed as a whole, and it is now generally considered that the best solution is to install a sectional unit drive in which each section of the machine from couch to reel is driven by a separate motor.

A recent example is provided at the Dartford Paper Mills, where one of the machines has just been equipped with a G.E.C. "Witton" sectional unit drive and made suitable for running at nearly double the previous speed. The machine itself has been completely reconstructed by Walmsleys (Bury), Ltd., suction rolls being installed and arranged in horizontal formation with the rolls in contact. The space taken up by the original Milne's continuous rope drive from a steam engine not only permitted the installation of a sectional drive of larger power but gave more ready access to the back of the paper machine.

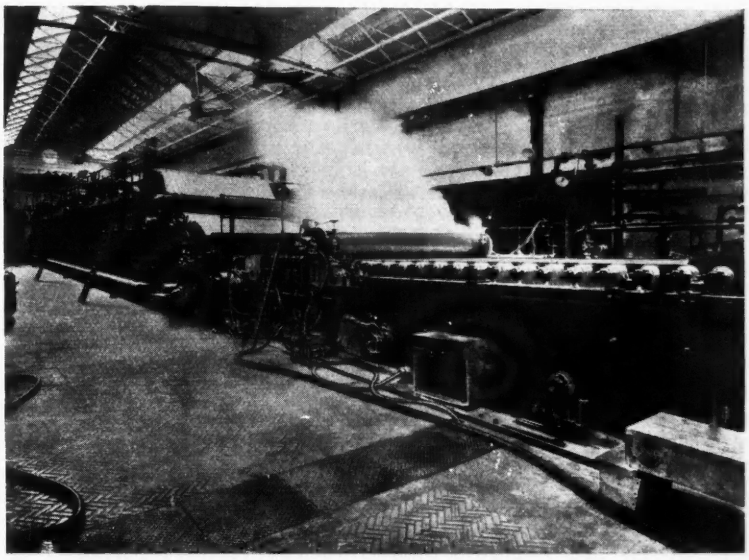
The various sections of a paper machine have to be driven at slightly different speeds in order to accommodate the changes in the length of the sheet, while the speed of the machine as a whole must be adjustable to suit the particular class of paper. In the G.E.C. system, these requirements are met by the use of DC section motors with an electrical differential system for maintaining the intersectional speed and a patent speed regulator for the control of the whole machine. The speed range specified was 10 : 1, *i.e.*, from 75 to 750 ft. per minute. To drive the sectional paper machine motors the AC from the main 3,300-V power supply of the mill (furnished by three 5,000-kVA, 6,000/1,000 RPM, G.E.C.-Fraser & Chalmers geared pass-out turbo-alternator sets) is converted to DC by means of a Ward-Leonard motor-generator set consisting of a synchronous motor and variable voltage DC generator.

The installation at Dartford comprises ten DC section driving motors. These are designed for a combination of voltage and shunt control and each has its own control panel and automatic draw-regulating mechanism. Two auxiliary sets are also provided, one being a master frequency set for the draw control and speed stabilising gear, the other an exciter and fan set.



Sectional unit drive motors for couch, dual press (two motors) and smoothing press

The master frequency set consists of a DC motor coupled in tandem to two alternators, one of which supplies the draw regulators and the other the main speed regulator. The motor is supplied from the m.g. set and is designed to give a speed directly proportional to the drive voltage over the whole speed range. The exciter and fan set consists of a squirrel-cage motor driving in tandem a generator, which provides excitation for the Ward-Leonard generators, the section motors, and the control gear, and a fan supplying ventilating air to the section motors. The motors for driving the various sections of the paper machine are either 40 or 90 HP according to the power required.



General view of paper machine from wet end

Each section is provided with a variable speed shunt-wound DC driving motor designed to give the required starting torque, which varies widely from section to section, and also to respond rapidly to the action of the shunt regulator. The machines are of the forced ventilated type, the air being introduced at the driving end so as to blow carbon dust out of the machine, and the drive is taken through metallic flexible couplings and totally enclosed double-helical reduction gears. The whole unit is mounted with the draw control mechanism on a cast-iron combination bedplate. The pulleys of the draw control mechanism are overhung so that the endless belts may be changed without dismantling. All the units were completely assembled at the Witton Works and fully tested before despatching, being placed directly on the prepared beds at the mills. This contributed considerably to the rapid change-over.

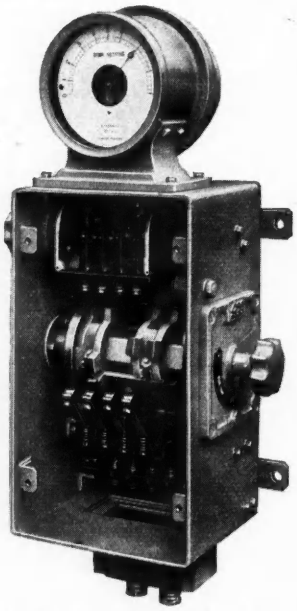
Each motor is provided with a contactor starter mounted on the main switchboard and is controlled from its own section controller on the front side of the paper machine. Means for adjusting the draw between sections is provided for each section by an infinitely variable speed gear driving an alternator from the section motor. The alternator unit is designed to reproduce in cycles the angular velocity of the paper machine rolls. This alternator feeds an automatic draw regulator controlling the section motor field. The variable gear takes the form of a pair of cone pulleys, on which the belt is retained in the required position by means of two guide pulleys working on the leading side. The guide pulleys are carried on pivoted arms, which are spring-loaded and automatically maintain a constant belt tension. The guide pulley arms are carried on a bridge piece, which slides on rigid guides and is traversed by means of a screw driven by a small geared motor. The mechanism is of the non-jamming type, and a slip coupling is provided between the motor and the screw.

The draw is controlled by means of switches placed on the front of the paper machine, each switch controlling the guide pulley motor for the section concerned. A draw indicator is mounted on top of the controller casing, showing the position of the belt in tenths of an inch from the end of the cone pulley. This feature has proved particularly valuable as it not only en-

ables the draw to be set beforehand for a particular class of paper but also shows the operator that the draw has been changed before the results show up on the machine. The cone pulley drive enables the speed of any section motor to be varied up or down to give greater or less draw.

For maintaining constant draw between sections, each section of the machine is provided with an automatic draw regulator working on the principle of an electrical differential. Each regulator consists of a stator and a rotor, which operates a DC rheostat connected in the field system of the section motor concerned. The stators are connected in parallel and supplied from the master frequency set, and each rotor is supplied from the appropriate section alternator. Thus the stators are supplied at a frequency proportional to the drive voltage and the rotors at a frequency proportion to the angular velocity of the paper machine rolls. The draw regulators are designed so that these two factors are matched against each other, and the speeds of the driving motors are automatically regulated to maintain the desired relation between them.

The speed of the drive as a whole is controlled by means of a motor-operated potentiometer controller connected in the field of the generator of the Ward-Leonard set, thus varying the voltage of supply to the section motors. The controller is provided with a large number of steps graded to give equal increments of speed over the whole range. For the whole speed range the increments are 4.5 ft. per step, which corresponds to speed increases of 6.0 per cent at bottom speed and 0.6 per cent. at top speed.



Section controller with draw indicator and control switch

The principle employed in the self-contained speed regulator used is the balance of a selected drive voltage against a constant voltage produced by a "lamp bridge," a device that has the property of giving an absolutely constant voltage independent of wide variations in the supply: in this case, the output voltage does not vary more than 0.05 per cent. with a supply voltage ranging from 190 to 250. The drive voltage and the constant voltage are connected in opposition through a very sensitive type of polarised relay. Any difference in the relation between them operates this relay, making contact with further relays that control a small motor-driven regulator. This regulator is connected in the field of the motor that drives the master frequency set, and thus varies the speed of the latter to compensate for variations in the speed of the paper machine. Means are provided to compensate for the effect of temperature changes in the circuits.

The speed regulator thus takes care of variations in the supply voltage, the load, and the temperature of the surrounding air, and has proved capable in practice of holding the machine speed constant within ¼ per cent. under all conditions from the initial starting up to the week-end shut-down. The paper can thus be made to a much closer specification, and the weight can be maintained well within the usual tolerances.

The DC supply from the motor generator set is taken to a line contact circuit-breaker on a main 11-panel switchboard of the steel cubicle type. This switchboard comprises a Ward-Leonard generator and master frequency set panel, an exciter set panel, and individual panels for the control of the section motors; each of the latter panels has a draw regulator and ammeter mounted on the front. The starting resistances are mounted at the top of the panels.

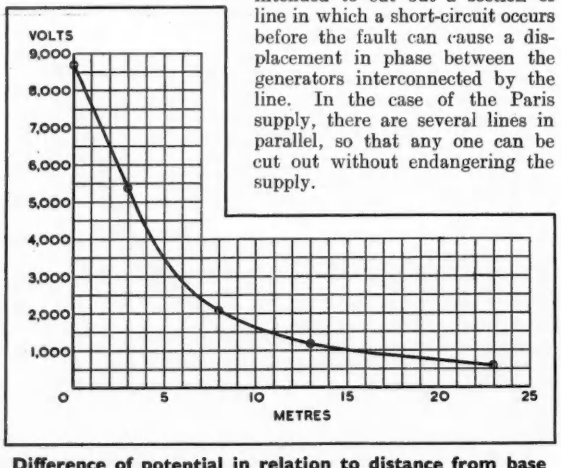
The switchgear, designed for heavy steelworks duty, is of the double-pole type. Full protection is provided, including no-volt protection to ensure that in the event of any section of the paper machine being shut down the section controller must be brought to the "off" position before the section motor can be re-started. The line contact circuit-breaker is interlocked with the starter of the exciter set, thus ensuring that none of the section motors can be operated until both the Ward-Leonard and the exciter sets are running. A large scale speed indicator with illuminated dial is mounted on the front of the paper machine and shows the speed of the whole machine in feet per minute: It is connected in parallel with a chart-recording speed indicator on the front of the generator panel of the main switchboard.

The drive, which has now been running continuously since the end of last year, has fully justified all the claims made for it, and has enabled higher operating speeds, with greater production, to be obtained without any loss in quality. Our thanks are due to Lord Portal, chairman of Wiggins, Teape and Co., Ltd., and to Mr. Philip Goldney, managing director of Dartford Paper Mills, Ltd., for permission to publish this description and the accompanying illustrations.

Transmission Tower Earth Gradients

Interesting French Experiments

THE need for obtaining exact information about the behaviour of the high-voltage lines forming the interlinking grid in France, particularly those feeding the Paris area, has induced the Union d'Electricité to experiment with the short-circuiting of the lines. The factors studied involved, in particular, the operation of the selective relays intended to cut out a section of line in which a short-circuit occurs before the fault can cause a displacement in phase between the generators interconnected by the line. In the case of the Paris supply, there are several lines in parallel, so that any one can be cut out without endangering the supply.



Difference of potential in relation to distance from base of tower

Oscillographs have, for years, provided some information, but it was considered desirable to provoke artificial breakdowns to obtain further data. This was done by the use of a thin copper wire, one end of which was fixed to the upper guard ring of a string of suspension insulators supporting a line conductor. The other weighted end was then attached by a piece of hempen cord to the pylon, a small explosive cap being fixed to the cord. In this way the wire attached to the upper guard ring could be allowed to fall down over the lower guard ring, causing a short-circuit to flash across the string of insulators merely by exploding the cap. This system has permitted relays along the line to be tested so as to make certain of their proper operation.

To determine the equipotential lines around a metal tower through which a conductor is short-circuited to earth a series of earthing pipes was driven into the ground parallel with the transmission line, spaced 3, 8, 13 and 23 metres respectively from the base of the tower. An earth (reputed zero potential) consisting of five earthing pipes connected in parallel, was then driven at 120 metres from the base of the tower. Measurements were made with oscilloscopes of the difference of potential between the base of the pylon and the reputed zero earth, and between each of the earthing pipes and the reputed zero. The short-circuit through the tower to earth was provoked in the same way as before described. Where there was danger that the difference of potential to be ascertained would be too great to be directly recorded by the oscilloscope, a liquid resistance was introduced into the measuring circuit to reduce the potential to a measurable figure.

The results of this test are shown in the accompanying graph. This gives an idea of the possible danger to a person walking near the base of a tower at the moment a conductor might be earthed through it. It was shown, moreover, that the maximum potential is maintained in the earth during the whole duration of the short circuit. Further experimentation on this point is now under consideration.

INSTITUTION PROCEEDINGS

Papers and Addresses

New Insulating Materials

SOME of the progress being made in the development of new insulating materials was indicated in the inaugural address of Dr. J. F. Gillies (College of Technology, Belfast) as chairman of the Northern Ireland sub-centre of the Institution of Electrical Engineers.

Commencing with references to power factor and theories of dielectric absorption, and passing on to a review of the newer materials, he explained that recent improvements had been, in a large part, due to knowledge of the type of molecular structure which was likely to lead to a satisfactory insulator for use under certain conditions. Perhaps the most outstanding had been a wide range of plastic insulators. In addition, there were the artificial rubbers, most of them non-inflammable, non-inflammable insulating oils, and the important groups of new ceramic insulators which had outstanding electrical characteristics.

After briefly reviewing the characteristics of these several classes he concluded by pointing out that certain ceramic insulators had excellent high-frequency characteristics. Two groups had unusual electrical properties. The steatite group, which included "Frequentite," "Calan," and "Calit," was marked by a very low dielectric loss at high frequencies, the power factor at a frequency of 10^7 c/s. being of the order of 0.0003. The dielectric constant of these materials was about 6, higher than that of most materials of such a low loss.

The ceramics of the steatite group were derived from soapstone and consisted of finely divided magnesium silicates. The firing process gave them a dense crystalline structure which resulted in a high mechanical strength although somewhat brittle. The second group was derived from rutile, a crystalline form of titanium dioxide characterised by a dielectric constant of 173 in the direction of the crystal axis. The various materials, such as "Condensa," "Tempa," and "Kerafar," in this group were obtained by firing with suitable binders and had dielectric constants varying from 40 to 60. In spite of this, the power factor of the rutile group was only slightly higher than that of the steatite group. The rutile group was remarkable in having a negative temperature-coefficient, but this could be neutralised by combining members of this group with members of the steatite group which had a positive temperature-coefficient. These materials had an important application in the manufacture of condensers for use at high frequencies. The advantages claimed, in addition to the small size, included low power factor, negligible temperature-coefficient, and electrical and mechanical stability. Little was known of the reasons for their peculiar properties.

Control of Mine Winders

MEANS of exercising control over the rate of acceleration and deceleration of Ward-Leonard & Ward-Leonard-Ilgner mine winders by purely electrical means, irrespective of the position of the driver's control lever, are described by Mr. H. Freeman (Kolar Gold Field Electricity Department) in the I.E.E. Journal for December.

The system, which has been devised by the author, can also be used for controlled regenerative braking in emergency. Messrs. John Taylor & Sons granted facilities for carrying out the experimental work involved, and the new system has been installed at Gifford's shaft of the Champion Reef Gold Mines of India, Ltd., which is of 1,150 HP (r.m.s.).

The control exciter is coupled to the winder through a ten-to-one increasing gear so that its speed is proportional to that of the drum shaft. This exciter armature is permanently connected across the generator field so that on the occurrence of an emergency trip it may excite the generator, the supply from the main exciter being cut off in these circumstances.

By providing the control exciter with two field windings and by suitably mixing the proportions of self (57 per cent.) to separate (43 per cent.) excitation, practically any desired exciter output characteristics may be obtained.

By making one end of each field winding common resistance can be inserted in this common lead progressively during the wind. As the difference in depth between the relative positions of the "up" and "down" cages is a definite amount, as is also the necessary amount of resistance inserted in the exciter field, it follows that the increase of resistance is proportional to the distance travelled by the cages, and therefore the control resistance may be operated by the usual depth indicator or its driving mechanism. In Gifford's hoist the total depth of the wind being 3,633 ft., the total variation in resistance between the beginning and end of a wind is $(3{,}633/2{,}633) \times 67.4 = 93$ ohms.

The method of connecting the two field windings, while simplifying their control, has an effect on the exciter armature current and thus on the generator field. This can be compensated for in the design of the exciter, but there is no reason why each field circuit should not be kept completely separate each with its own control resistance, when the complications in the exciter design disappear. Doing this, however, complicates the switching of the control resistance.

The whole of the apparatus for the system was made in the local workshops, and the fitting of this and the change-over to the new system was done with only a few hours' interruption to service. The deceleration times under test agree very closely with those calculated; even with regenerative braking, much more rope oscillation is caused by the application of the mechanical brakes just before coming to rest than is caused by the regenerative braking itself.

In normal service using the author's system the greatly increased latitude in the movement of the control lever is very marked, there being no sudden heavy rush of current when, during acceleration, the control lever is moved even as far forward as three-quarters full travel from neutral, but the winder accelerates smoothly up to the corresponding speed. Similarly, on moving the control lever from full speed straight to neutral, the winder decelerates smoothly to creeping speed and remains at this speed until further movement of the lever, or until the mechanical brakes are applied. The normal acceleration and deceleration have not been interfered with.

It is the fact that the apparatus is in continuous service during normal operation of the winder, and does not have to wait until an emergency occurs before doing any work. That is, in the author's opinion, a very strong point in its favour as an emergency device. Should any fault develop, it is immediately apparent during normal working; in fact, the winder could not be worked at all with any fault on the control exciter with the exception of an open-circuit in the exciter armature circuit, which would be immediately reflected in the loss of that latitude of movement in the control lever which is so apparent with the use of the system. Furthermore, whatever type of fault should develop on the control exciter, emergency braking is immediately thrown back on to the mechanical brakes.

Selection of Switchgear

AN illustrated commentary on some of the factors that govern the selection of low voltage switchgear was delivered by Mr. R. T. Lythall at a meeting of the Association of Supervising Electrical Engineers in London on December 19th.

It was not logical, said the lecturer, to expect a higher limit of practicability for circuit-breakers in the 440-660-V range than for high-voltage gear. At first sight 100,000-kVA rupturing capacity might seem modest, but at 400 V it approximated to 140,000 A (breaking) or three times the limit now accepted for high-voltage gear. It might be argued that short-circuit breaking duty would be eased somewhat by reason of the lower potential, but that was not the only function to be performed. The possibility of having to close the switch under fault conditions had to be reckoned with, in which case the current might be anything up to 2.55 times that at breaking, or 357,000 A in the example quoted above.

The lecturer supported the recommendation of B.S.S. 116-1937 that some form of power closing mechanism should be provided when the switch had to break more than 1,000 A. It was not reasonable to expect that manual closing of low-voltage gear could successfully overcome the very high electromagnetic forces involved, while the capabilities of such accessories as overload and current transformer coils must also be taken into account.

It was therefore wise to limit the short-circuit duty demanded of low-voltage gear, and for that purpose a specification was nearing completion on similar lines to B.S.S. 116-1937, which governed the selection of high-voltage gear.

The lecturer next dealt with the need for system layout study in order to limit fault currents, advocating sectionalisation with transformer capacity limitation to 1,500 kVA, or 2,000 kVA when more distant from the switchgear. When dealing with factors that affect short-circuit values, the lecturer recalled an article of his in the ELECTRICAL REVIEW of January 27th, 1939, with reference to the need for careful choice of details when selecting switchgear for various types of circuits.

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Technical Institutions in Wartime

THE technical institutions are finding it a difficult matter to maintain their normal activities in wartime. In the first place the majority of their members are so busily engaged in some form or other of work of national importance that the requisite number of papers is not forthcoming and secondly many of the institutions are finding it impracticable to hold their meetings as this often involves a certain amount of travelling for the members which, in view of the black-out and other considerations, they are anxious to avoid. Another difficulty is that while certain problems which might have been discussed have lost their immediate interest, others—and these are the most interesting—are of such a nature that it might be impolitic to discuss them.

A number of institutions are endeavouring to "carry on" as usual but others, including the Institution of Electrical Engineers, are adopting the procedure of sending copies of papers which would otherwise have been read, to their members and inviting written discussion for publication in the "Proceedings." In normal times, written contributions to the discussion of a paper often contain much that is of particular value since the writer has available the leisure of his study and the resources of his library both of which are, of course, lacking in the extempore contribution.

If contributors keep in mind the fact that the publications of our technical institutions are subjected to the scrutiny of the official censor, these written discussions—to which the author would reply—should prove a valuable source of knowledge not only to the members of the institution, but, through the technical Press, to the engineering world at large.

London, W.C.1, *December 15th.* A. REGNAULD.

Group Buying

I noted with interest the editorial comments in your issue of December 8th, wherein you express the hope that group buying does not mean an inferior quality low-priced article. The I.A.E.P.C. scheme of group buying is not a new departure, having been in operation for some years. Apparently it has been so successful that its scope is now being extended.

Most of the company supply undertakings give service after sales, and it would obviously not be in their interests to supply inferior quality goods. I think you will find on further investigation that before buying in bulk, sample goods are subject to very stringent tests for efficiency and safety. My own experience of goods offered under this scheme is that they are very reliable, and in some cases compare very well with those on sale in the ordinary retailer's shop at twice the price.

Liverpool, *December 12th.* H. J. FRASER, A.M.I.E.E.

Adequate Wiring and Rewiring

The rigidity and non-extensibility of conduit installations and arguments in favour of the use of more flexible wiring systems were put forward in my article "House Wiring" in your issue of October 6th, and I am gratified to note that Mr. H. R. Taunton subscribes to these views, to the extent of adding a good word for the often despised "cab-tyre" installation. I feel, however, that very few will accompany him along the road labelled "bare-neutral," if all factors are taken into account. An extremely interesting and convincing case has been put up by the American Electric Light and Power Group, and this has lost nothing in Mr. Taunton's able summary. It gives, however, only one side of the problem, and there are two other publications that should be read in conjunction with those mentioned by Mr. Taunton.

These are called "Report of Committee on Electrolysis and Electrical Interference," and "Promiscuous Electric Grounding on Water Service Pipes and Mains," both issued by the American Water Works Association, and can be obtained from its offices, 22, East 40th Street, New York. Space will not permit extensive extracts from these booklets, but quotations from them were made in my article "Multiple-Earthed Neutrals" (ELECTRICAL REVIEW, July 28th, 1939), indicating the implacable opposition of the water works concerns to any further extension of bare neutral wiring, even to the extent of withdrawing permission for earth connections to be made at any point to water pipes or mains. This attitude has been taken following considerable experience with bare-neutral wiring in the United States, and the water companies are not, of course, represented on the committees of the Electric Light and Power Group. The presentation of the case as viewed by this authority is, therefore, obviously incomplete, and due cognisance of the water companies' views should be taken, and the case fully presented to them, before any extensive missionary work is undertaken in this country.

The formation of an Installation Section of the I.E.E., of which you are so able an advocate, would provide the forum for this work, and all men in any way concerned with installation work would agree that our present methods are far from ideal, and their shortcomings too obvious. As Mr. Taunton states, the problem is to find alternatives.

Whilst I would be the last to oppose new ideas in wiring, I feel that nothing less than the whole case should be put forward in connection with bare-neutral wiring, which, on the face, appears to offer attractive possibilities. My own ideas have mainly travelled the path of the removal of the heavy and expensive earth circuit, necessitated by present methods, and the substitution of lighter protective circuits in conjunction with insulated forms of wiring, and it is gratifying to note that even now some tendency towards this end is discernible. Mr. Taunton's own views are running somewhat parallel, as exemplified in his recent articles, to which I would offer a belated tribute.

Folkestone, *December 16th.* T. C. GILBERT, A.M.I.E.E.

Safe Earthing

Earthing high-voltage cables before allowing the jointers to commence operations has always been considered a risky proceeding but for some considerable time now the mains section of the undertaking with which I am associated has been able to carry out this operation with comparative ease and safety without the use of a heavy hammer. The tool is clamped to the armour which has previously been cleaned to make a good earth and the pointed spike can be screwed into the cable through the armour lead and conductor with very little effort, the operator wearing a pair of good rubber gloves as an extra precaution. The spike has a flexible pigtail and, if necessary, the complete tool can be separately earthed by a copper conductor to a bonding clamp or other good earth.

Whilst it is almost impossible to miss one of the cores when working on a 0.15 three-core p.i.l.c., s.w.a. cable, it is a simple matter to spike the cable in two or three places a few inches apart; this proceeding does not damage the lead insulation or cores, or make it any more difficult for the jointer to carry out his work, which is more than can be said of some methods of earthing in common use.

A simple check can be arranged at one end of a dead cable by using test lamps which will light up when a core is earthed and an observer can then signal to the jointer when his earth spike makes contact with a core. The following notice is inscribed on a vitreous enamelled plate on every jointer's kit:—

> IMPORTANT.
>
> All underground wire armoured cables upon the system are to be deemed extra high pressure. No work is to be done upon any such cable until after a 4-in. nail effectively earthed by a connection of not less than 7/18 strands or its equivalent has been driven completely through the centre of the cable. Before the cable is so treated all reasonable precautions must be taken to see that it is dead.

Whilst I cannot recall any instance of our jointers spiking a live cable intentionally, roadmaking squads have on several occasions driven fencing pins or spikes through them without warning and without suffering any serious injury, though such a practice is to be deprecated.

One size of high-voltage cable only, i.e. 0.15 three-core p.i.l.c., s.w.a. for 6,600 V unearthed neutral B.S.S. No. 7 (Revised 1926), is referred to in the foregoing notes; users of other sizes must make their own observations and tests before deciding whether or not to rely on the apparatus.

Sunderland, *December 1st.* R. D. SPURR.

Bathroom Fatality

AT the inquest held in Sheffield on December 5th on Mrs. Cynthia Dickinson (31), a resident on the Parson Cross housing estate, who received a fatal electric shock in her bath, the Coroner said that something should be done to warn the public of the dangers of electric heaters in bathrooms. He suggested that warning circulars should be sent to people living on the large housing estates. Recording a verdict of "Accidental death," he found that the woman had met her death through grasping an electric bowl fire while standing in a bath half full of water. The electricity had been switched on when the heater was out of repair and defective.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

MEMBERS and friends of the Birmingham Electric Club, numbering 220, partook of a Christmas luncheon on December 15th at the Grand Hotel. The president, **Mr. J. Hamilton,** was in the chair, and intimated that it was proposed to return to the ordinary club meetings, provided the necessary active support was forthcoming; a postcard vote would be taken to ascertain members' views. Musical items were rendered by Messrs. E. Vaughan, St. George and A. T. Haywood. The latter, the honorary social secretary, was responsible for the arrangements. During the luncheon a collection for the E.I.B.A. raised a total of £4 4s.

In our issue of October 13th we announced that **Mr. A. B. Catling,** A.M.I.E.E., had been appointed acting borough electrical engineer at Barking, consequent upon the retirement of Mr. W. E. Kidner, M.I.E.E., the borough electrical engineer. At the recent monthly meeting of the Barking Borough Council Mr. Catling was appointed borough electrical engineer. He joined the Barking electricity undertaking as mains superintendent in 1929 and a few months later became deputy borough electrical engineer.

Mr. A. B. Catling

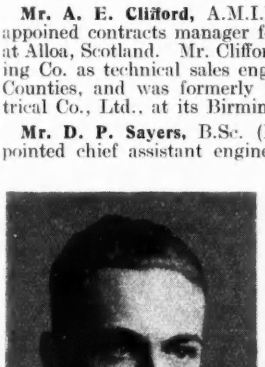
Mr. J. A. Butters, of Galashiels, has been appointed district mains engineer with the Scottish Southern Electric Supply Co., Ltd., at Berwick, in succession to Mr. J. F. Urquhart, who has joined the Perth Corporation Electricity Department. Mr. Butters will be in charge of the Berwickshire and North Northumberland area.

Mr. A. G. Connell, A.M.I.E.E., M.I.Mech.E., M.A.Min.E.E., chief electrical engineer to the Staveley Coal & Iron Company, Ltd., has been recommended by the Halifax Corporation Light, Heat and Power Committee for the appointment of chief electrical engineer and manager of the Halifax electricity undertaking at a salary of £1,300 per annum. Mr. Connell will succeed Mr. G. A. Vowles, who recently took up a similar position at Ipswich.

Mr. R. M. Gravett, A.M.I.E.E, has been appointed mains engineer to the Borough of Ealing Electricity Department. Mr. Gravett is at present an assistant mains engineer on the head office staff of the Shropshire, Worcestershire and Staffordshire Electric Power Co., and was formerly with the Wolverhampton Corporation Electricity Department in various positions in the distribution department and the power station.

Mr. A. E. Clifford, A.M.I.E.E., A.M.I.Mech.E., has been appoined contracts manager for the Harland Engineering Co. at Alloa, Scotland. Mr. Clifford was with the Foster Engineering Co. as technical sales engineer in London and the Home Counties, and was formerly with Metropolitan-Vickers Electrical Co., Ltd., at its Birmingham and London offices.

Mr. D. P. Sayers, B.Sc. (Hons.), M.I.E.E., has been appointed chief assistant engineer in the Sheffield Corporation Electricity Department at a salary of £950, rising to £1,200, per annum. Mr. Sayers joined the distribution department of the Sheffield electricity undertaking in 1936, and was appointed head of that department in 1938. Other changes in the Electricity Department are: **Mr. A. Haddock,** B.Sc., A.M.I.E.E., has been appointed distribution engineer at a salary in accordance with Class M Grade 3 of the N.J.B. Schedule; **Mr. W. E. B. Nettleton,** chief distribution assistant, Class M Grade 6 of the N.J.B. Schedule; **Mr. R. H. Hook,** accountant, at a salary of £650 per annum; and **Mr. W. P. Marshall,** assistant accountant, at a salary of £550 per annum.



Mr. D. P. Sayers

Mr. W. Farmer, assistant distribution engineer with the Woolwich Corporation Electricity Department, has retired after thirty-eight years' service.

Ald. J. W. Longley, chairman of the Bradford Corporation Electricity Committee, who was recently married, has been presented by the staff of the Electricity Department with an electric Westminster clock and an electric razor. The presentation was made by Mr. T. Roles, the city electrical engineer.

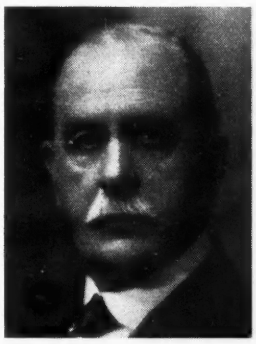
Major J. Entwistle, R.E., A.M.I.E.E., director of H. J. Baldwin and Co., Ltd., Nottingham, and member of the executive sales staff of Simplex Electric Co., Ltd., has been on active service since August 25th. His private address is 325, Pershore Road, Edgbaston, Birmingham, from where his correspondence will be forwarded.

Mr. F. T. Edmonds is recommended for promotion to the position of engineer-in-charge at the Hammersmith Borough Council's station as from January 1st, to fill the vacancy caused by the retirement of Mr. W. Jessop, senior engineer-in-charge.

The members of the Northmet Power Co. (Hertford) Social Club held a dinner last week when **Mr. R. F. Winder,** resident engineer, presided. During the evening it was announced that Mr. C. R. Marshall had relinquished the presidency and had been succeeded by Mr. Winder.

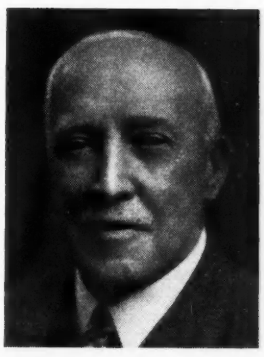
Obituary

Mr. F. W. Clements.—Many of our readers will learn with regret of the death of Mr. Francis William Clements, chairman of the State Electricity Commission of Victoria, which occurred in Melbourne on December 12th. Born at Halstead, Essex, he joined the Brush Electrical Engineering Co., Ltd., in 1881, and supervised important contracts in England and on the Continent. In 1900 he went to Australia, where he founded the Melbourne Electric Supply Co., Ltd., of which he became chief electrical engineer and managing director. He held this position until 1930 when the company was taken over by the State Electricity Commission, and he was appointed Electricity Commissioner and deputy chairman of the Commission. Upon the death of Sir John Monash, chairman of the Commission, in 1931, he was appointed to succeed him and held the position until the time of his death. Mr. Clements was described by Mr. Hogan, the State Premier, as "probably the greatest electrical engineer in Australia." In 1935 he was awarded the Peter Nicol Russell Memorial Medal, the highest award of the Institution of Engineers of Australia.



The late Mr. F. W. Clements

Mr. L. G. Sloan.—We regret to record the death of Mr. Lawrence Gunn Sloan, J.P., chairman of the Sloan Electrical Co., Ltd., which occurred on December 13th at the age of eighty. Mr. Sloan was born and educated in Edinburgh, where he started his career in the City Chamberlain's office. He came to London when he was eighteen, and became connected with "Waterman's" pens and "Hardtmuth" pencils. It was through his connections with the Continent that he obtained the agency for Conradty carbons in 1898. In those days street lighting was by arc lamps, but no carbons were manufactured in this country. In 1899 Mr. Sloan formed the Sloan Electrical Co. and built up an organisation which supplied a large number of carbons to electricity undertakings, railways, dockyards, &c., throughout Great Britain. With the expansion of the electrical industry the company gradually became general electrical wholesale distributors.



The late Mr. L. G. Sloan

Mr. Sloan's interests were many. He was a keen Rotarian, J.P. for the County of London, past-president of the London Burns Club, life director of Royal Caledonian Schools, past-president of the Rotary Club of London, and past-president of the Electrical Industries Benevolent Association. He was also chairman of L. G. Sloan, Ltd., and a director of Philips Lamps, Ltd. The funeral service took place on December 15th at St. Andrew's Presbyterian Church, Finchley Road, and the interment was at Hampstead Cemetery.

NEW ELECTRICAL PRODUCTS

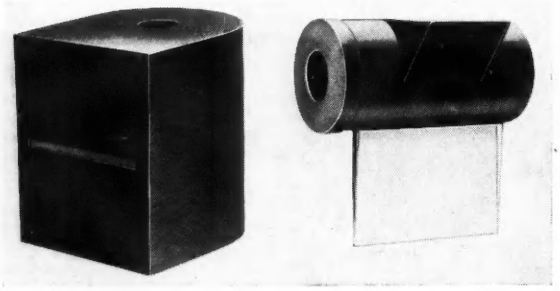
Review of Equipment Recently Marketed

Shop Window Lighting

SIMPLE "Mazdalux" fittings for the general lighting of windows and for display cabinet lighting, both complying fully with the new regulations, are available for immediate delivery at attractive prices from the BRITISH THOMSON-HOUSTON CO., LTD., Rugby.

The former is an attractive unit of sheet metal for shade ring mounting. It is fitted with frosted glass in the slot and is finished matt black inside and out. The fitting should be rigidly fixed close to the glass at the top of the window.

The display cabinet fitting is intended for mounting behind



"Mazdalux" general shop window lighting fitting and display cabinet lighting unit

the screening pelmet of the cabinet, so that the pelmet return cuts off the light and prevents it falling in front of the display platform. It is made of sheet-steel with frosted glass in the slot, and is finished matt black inside and out, except for the reflecting surface which is matt white. A 25-W pearl lamp must be used in each of these fittings.

Luminous Torch Disc

The regulations for the use of battery torches require the light to be diffused by means of, for instance, tissue paper. A suitable medium, which, moreover, serves a double purpose has been produced by GRAHAM BROS., 7-8, Bradford Avenue, Redcross Street, E.C.1.

This, the "Fairylight Flashglow," is a translucent material treated with a luminescent chemical, and it not only diffuses the light but serves as an indicator to prevent collisions with other pedestrians

General-purpose Fire

A useful fire, the "Creda Warden," suitable not only for air-raid shelters but for general use as well, is announced by the SIMPLEX ELECTRIC CO., LTD., Broadwell Road, Oldbury, Birmingham. Its 1-kW element, besides warming the room, can be employed for boiling a small kettle, making toast or keeping food warm. Enough water for two cups of tea can be boiled in about 10 minutes. Weighing 6½ lb., the unit measures 15¼-in. high, 12 in. wide and 6¼ in. deep and is finished in black and copper.

"Creda Warden" fire

Controller Contacts

To help to make up the scarcity of supplies occasioned by the cessation of imports from Germany, ELECTRICAL EQUIPMENTS (CARDIFF), LTD., Tresillian Engineering Works, Dumballs Road, Cardiff, who hitherto have mainly confined their activities to motor, &c., repairs, are now producing controller contacts of all types in copper, brass, phosphor bronze, &c. Special light shades for railway carriages, &c., are another recent development.

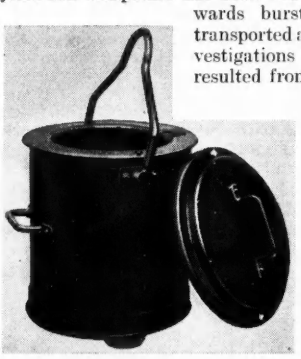
Electric Blankets

The new model "B" electric blanket made by the WARM-GLOW CO., 1,133, London Road, Leigh-on-Sea, measures 54 in. by 36 in. and is intended for single beds only. Like previous models, it is all wool and is available either white or coloured rose, royal blue or camel. The electrical loading is only 45 W. Full safety features are incorporated and there is no risk of overheating, a 16-day continuous test recording a steady temperature of 125 deg. F. Three yards of non-kink cab-tyre flex is provided, together with a b.c. adaptor. The model "B" blanket has the same safety features as the larger types. Since these were marketed six years ago there has not been a single accident.

Model "B" Warm-Glow blanket

Jacketed Compound Carriers

During recent years there have been several cases where joint-box compound has been heated above ground and afterwards burst into flame while being transported along roadways in mines. Investigations have shown that these fires resulted from overheating the compound and that a contributory cause in some cases was the lagging of the container with unsuitable materials.



B.I. jacketed compound carrier

Accordingly BRITISH INSULATED CABLES, LTD., Prescot, Lancs, have designed a jacketed compound carrier with non-inflammable lagging and efficient heat insulation, so that the compound may be maintained at or above pouring temperature for a considerable time without having to overheat it. Side, lid and bottom are all insulated with glass silk, the bottom being detachable. Two sizes holding 20 and 40 lb. are available.

A.R.P. Lighting Fittings

Two new domestic lighting developments are announced by SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, London, E.C.4. One of these is an attractive little table lamp 8½ in. high with a 4½-in. diameter base, specially designed for use under the present lighting restrictions. The black opaque shade is adjustable and can be arranged to confine the light to a restricted area. A key-hole piercing of the base enables the standard to be fixed on a wall, if desired. The unit is finished in chromium plating. An alternative shade in crackle finish natural parchment is available.

Siemens table standard and A.R.P. shade

The other unit is an English pottery A.R.P. shade which is intended to facilitate compliance with the restrictions, while providing a decorative feature in the home that will harmonise with most surroundings. The decoration is a hand-painted floral design on a biscuit background, both inside and exterior being glazed.

STREET LIGHTING AGAIN

Restrictions Modified

STREET lighting in a very much modified form is to be permitted again all over the country with the exception of the East and South East Coast areas. Announcing this decision in the House of Commons last week, Sir John Anderson, Minister of Home Security, said that it had now been found possible to devise a type of low intensity street lighting which satisfied the requirements of the Air Staff, and that the Lighting (Restrictions) Order was being modified accordingly to permit the lighting. With regard to the East and South East Coasts, it might be possible for the Government to extend the system to them also after a final test of visibility from the air has been carried out by the R.A.F.

The new lighting was in no way comparable with that ordinarily in use and would give much less light than the modified form permitted during the last war. It had, however, been established that it was of considerable value in facilitating movement in the streets and would add materially to the comfort and safety of pedestrians. The light would be so diffused that it would not reduce the effectiveness of the permitted lights of vehicles or affect the visibility of traffic lights.

In a broadcast explanation of the new system of lighting, Sir John said that normal street lighting was out of the question and that an entirely new scheme had to be evolved which would not give any assistance to air raiders. The danger was not, as many people thought, in light which cast its beams upwards. What made a town visible to aircraft was the pool of light on the ground which was reflected upwards, and the problem had been to bring the light down to an intensity which would help the pedestrian without producing this effect. After many experiments, tested by the R.A.F. from the air, this problem had now been solved, with the assistance of the illuminating engineers. He did not claim that it was cheerful, but after testing it himself he had found that it enabled him to move about with much more confidence and freedom than in the full black-out. He would have been delighted if at this Christmas time he could have given cheerful streets and really bright shop windows, but the black-out was an essential part of our air defences, and all would agree that it would be wrong to sacrifice one of our main weapons of defence for the sake of personal comfort and convenience.

The British Standards Institution, 28, Victoria St., London, S.W.1, hopes to publish this week a specification (BS/ARP 37) covering the new lighting. It will cost 6d. (8d. post free). A draft which we have seen points out that the order of illumination, while very low, will provide some comfort and convenience to users of the streets, and will not be such as to call for any adjustment of the intensities of lighting of the existing "aids to movement." It is intended that the fittings providing the low-level illumination should be mounted on existing columns, and provision has been made for a range of mounting heights at present in general use, by prescribing standard light distributions.

The illumination on a horizontal surface at road level prescribed is 0.0002 ft.-candle. It is recognised, however, that complete uniformity cannot be achieved, but the general level of illumination will approach closely to the above value and will nowhere exceed 0.004 ft.-candle. Pearl lamps must be used, and with regard to the permissible light distribution, the polar curve of the lighting fitting must be within prescribed limits according to the nominal mounting height. The light distributions prescribed are associated with nominal mounting heights of 10, 15 and 20 ft. respectively, and fittings having these distributions may be mounted at a specified range of heights, provided that the spacing of the fittings is not less than 100 ft. Alternative mounting heights are given for cases where the columns are spaced at between 75 and 100 ft. and where it is inconvenient to use every second or third column. To provide for spacings of less than 100 ft. where the actual mounting height is less than 14 ft., an additional standard distribution curve is in preparation.

The fittings must be fixed vertically and with sufficient rigidity to prevent the emission of any light above the horizontal and to prevent rotation. Those parts of the columns close to the light sources must not be unduly bright and where the units are close to light-coloured vertical surfaces, blackened side screens must be provided to prevent direct light falling upon such surfaces. Where fittings complying with the specification are attached to existing lanterns, steps must be taken to prevent interference with the light distribution and in particular to prevent light being reflected upwards by glass panels or any part of the complete fitting. One of the essential features of the Specification is that only fittings which have been certified as conforming to the Specification, in accordance with the ordinary licensing procedure of the B.S.I., will be permitted.

The Specification has been prepared by the Joint Lighting Committee of the Illuminating Engineering Society and the Home Office, and is still subject to alteration, but as the distribution curves and light intensity defined therein correspond with those of the experimental installation approved by the authorities, no major alterations are anticipated.

While the new lighting system does not provide any great amenity, it has been pointed out by one of the illuminating engineers responsible that it has been necessary to find a compromise between the maximum amount of light which is invisible from the air and the minimum which is of any practical value. A test of the new system arranged at Burnt Oak last week showed that it enables pedestrians to see obstacles at a distance of about 25 ft., while motorists can see the boundaries of the road, but it does not assist them to see pedestrians, who, therefore, are urged not to relax precautions taken for their own safety. All the leading manufacturers are already preparing to supply the necessary fittings and it is hoped that all areas will be able to have lighting within the next few weeks.

Parliamentary News

By Our Special Reporter

Torch Battery Prices

IN the House of Commons on December 13th Mr. Windsor asked the President of the Board of Trade if he was aware of the great shortage of No. 8 torch batteries; that these batteries, formerly sold at 3½d., which included a rise in price, were being retailed in many places at 6d. and 8d.; and whether he would take steps to prevent this unwarrantable rise in price.

Mr. Stanley said he had received complaints that high prices were frequently charged for torch batteries. The question of applying the Prices of Goods Act to electric torches and refill batteries was under consideration.

Notting Hill Charges

On December 14th Mr. Duncan asked the Minister of Transport whether, having regard to the fact that the Notting Hill Electric Lighting Co. was threatening to increase its standing charges for lighting to certain shopkeepers and others in the Notting Hill Gate area by from 80 to 150 per cent., he would order an inquiry to see if these increases were justified, and whether he would refuse to sanction such increases until the inquiry had been held.

Captain Wallace said that the Electricity Commissioners were in communication with the company on the matter.

Electricity Commission Chairmanship

Mr. Parker asked the Minister of Transport whether he was aware that there was strong feeling that the chairmanship of the Electricity Commission should be a full-time post, and what steps he was taking to obtain the services of a good administrator to carry out these duties.

Captain Wallace said he was satisfied that the arrangements in regard to the chairmanship of the Electricity Commission were the best that could be made in present circumstances in the interests of the electricity industry and the consumers.

The Bikker Lamp

Mr. Parker asked the Home Secretary whether experiments had been held in the employment of lights, such as the Bikker, adopted for frequent use in Holland, which could not be seen from the air, to illuminate road kerbs and crossings, and if so when they would be generally introduced.

Sir John Anderson said that the performance of the Bikker lamp was investigated some time ago by officials of his Department, but they did not regard it as suitable for the purpose suggested in the question. It produced a directional beam of light without side spread, but any object which its light illuminated was, of course, as visible from the air as if it were lighted by any other light of the same intensity.

C

COMMERCIAL and INDUSTRIAL NEWS

Electric Torch Production. Arc-lamp Carbon Pool. Bigger Electrical Exports. Non-Ferrous Metals Order. Fluorescent Lighting Display.

Making Torches

THE recent unprecedented demand for electric torches creates particular interest in a new factory which Hawk, Ltd., metal goods manufacturers, have just established at the Treforest Trading Estate, Pontypridd, South Wales. Perhaps the most striking feature of this new enterprise is the short time taken to get into operation, for although production work was only begun three months ago, manufacture is now in full swing and production is gaining further impetus every day, in spite of difficulties—which are rapidly being surmounted—due to unskilled labour.

Various types of hand-lamp cases and torches are produced at the factory, mainly for export, but when the production

Assembly line at Messrs. Hawk's torch factory

manager showed us round a few days ago work was concentrated entirely on the popular cycle type of lamp, for which large orders are in hand. The torch cases are constructed almost throughout of cold-rolled pressed steel, which is received at the factory in strip form. Cases, heads and lids are first pressed out in one piece on high-speed electrically operated presses, trimming being carried out as a subsequent process. A battery of small power-driven presses stamps out most of the smaller components, while hand presses are employed for such operations as making holes in the heads and piercing reflectors previously pressed out of strip brass.

The finished components all go to the stores, whence they are issued as required. Assembly is on a well-planned flow system, every process following smoothly on the preceding one. Finally, the torches are degreased and stove-enamelled in a 13-kW electric oven. It is proposed shortly to install electroplating plant for dealing with the reflectors, this process at present being carried out elsewhere. All the press tools required are made on the premises. The factory has succeeded in engaging in a short time a substantial amount of unemployed labour from the surrounding distressed area, and the numbers working there are daily increasing.

A.R.P. Signs

An effort to bring about uniformity and avoid confusion is behind the issue of BS/ARP-32, one of the series of Specifications drafted with the approval of the Home Office and assistance of the Illuminating Engineering Society. It standardises the size, form and other details of the signs, both illuminated and otherwise, employed by local authorities for indicating the positions of public air-raid shelters and eleven other types of premises that are being used for A.R.P. work. Copies are obtainable at 8d. each, post free, from the British Standards Institution, 28, Victoria Street, London, S.W.1.

Arc-lamp Carbon Pool

This week an important scheme for co-ordinating the production and distribution of arc-lamp carbons for civil purposes was announced by a committee representative of the General Electric Co., Ltd., the Morgan Crucible Co., Ltd., Henrion Carbons, Ltd., and Charles H. Champion & Co., Ltd. (Ship Carbon Co. of Great Britain, Ltd.) under the independent chairmanship of Sir Sydney Chapman, formerly Permanent Secretary to the Board of Trade and Chief Economic Advisor to the Government. After meeting the heavy demands of the Services the manufacturers had to consider how best to meet the needs of cinemas, hospitals, drawing offices and other large consumers of carbons. For this purpose they require eight weeks' notice of the demand and are accordingly seeking the co-operation of the users. Questionnaires have been circulated to them asking for details of stocks, expected consumption, arc lamps in use, and the possibility of using alternative sizes or types of carbons if necessary. It is requested that the cards shall be returned by January 5th. It is proposed that the "rationing" of carbons shall commence on February 1st next. In the meantime existing contracts will be fulfilled at current prices. When rationing starts there will be a rise of about 10 per cent. in price to cover increased costs of production.

For their part, the manufacturers have arranged to pool their resources of stocks, manufacturing facilities, packing materials, &c. Manufacturing programmes will be co-ordinated to ensure that all future Service and civilian requirements will be met. There will be a certain measure of "rationalisation" of types. The plans have been drawn up in consultation with, and with the approval of, the Ministry of Supply. The principal associations of the industries affected by the scheme have also approved. No attempt will be made to interfere with or influence the channels of supply through which the consumer normally obtains his carbons. The scheme is being operated by the British Arc Lamp Carbon (War Emergency) Pool, 42, Oxford Road, Putney, S.W.15.

Electrical Exports Improve

There was a marked recovery in British exports of electrical good and apparatus in November, which reached a value of £915,770. Although considerably less than in November last year, when shipments attained nearly record proportions—£1,258,668—this amount compares with £566,518 and £510,038 in the first two months of the war and was not much less than in the month immediately preceding the outbreak of hostilities (£935,095). Machinery exports, including electrical, last month were valued at £3,296,678, over a million pounds more than in either of the two previous months; last year the amount was £5,119,063. Imports of electrical goods were worth £228,853, which compared with £124,883 and £202,346 in the first two months of the war and with £286,048 a year ago. Machinery imports of all types, at £1,931,834, were not much less than in November last year (£1,935,306).

"Thermovent" Publicity

"Heating from the mains is true war-time economy" is the theme of the December issue of "Thermovent News," published by E. K. Cole, Ltd. It is emphasised that relaxed fuel rations do not affect the sound reasoning which led to the trend towards electrical heating methods. A chapter is devoted to heat loss calculations and the topical subject of background heating is illustrated and described. The issue also contains facts and figures relating to the heating of a typical outfitting establishment, with consumption and running cost data.

EMERGENCY HEATING - SAFE, EFFICIENT, ECONOMICAL
IDEAL FOR ARP SHELTERS
NO DANGER OF FIRE
EASILY TRANSPORTABLE
AUTOMATIC HEAT CONTROL SAVES CURRENT AND KEEPS TEMPERATURE STEADY
THERMOVENT
Natural Convection Heating

New "Thermovent" double-crown poster

The company has prepared an attractive double-crown poster which is now available to all dealers stocking "Thermovent" convector heaters, which emphasises the safety, efficiency and economy of the heaters.

Australian Tariff Decisions

The Commonwealth Department of Trade and Customs has issued a number of decisions respecting the application of the Customs tariff. Among the goods which are to be admitted free of duty under the British preferential tariff are the fol-

lowing :—Non-spillable storage batteries for aircraft; cooker hot-plate controls employing a vacuum switch; phase-sequence indicators; copper oxide zinc coated plates for rectifiers; industrial heating regulators employing a hot-wire vacuum switch and vacuum relay; rotary synchronisers or synchroscopes; parts of vibrators of the types used in radio sets; dynamos, dynamo-magnetos and starting motors (24 V and under) for use on motor vehicles. Copper cable, varnished cambric insulated and cotton covered (not being weatherproof braided aerial cable) is subject to a preferential duty of 27 per cent. *ad valorem.*

Ceylon Import Prohibitions

Under Orders made by the Ceylon Government the importation of a large number of classes of goods into Ceylon from "Canada or any territory or place not forming part of the British Empire" is prohibited. The list includes the following :—Ferrous and non-ferrous electrodes; electric wires and cables; electric lamp bulbs; telegraph and telephone apparatus (except batteries), other than wireless; electric batteries and accumulators (except splashproof for motor vehicles), other than dry cell batteries; boilers and boiler-house plant; cranes, hoists and lifting machinery; control and switchgear; generators, alternators, dynamos and exciters; motors; transformers and convertors; and ignition magnetos. The following classes of goods may be imported under licence :—Wireless goods and apparatus; dry cell batteries; and electrical goods and apparatus, other than telegraph or telephone apparatus and electric batteries and accumulators.

Non-ferrous Metals Control

In pursuance of Regulations 55 and 98 of the Defence Regulations, 1939, the Minister of Supply has issued the Control of Non-Ferrous Metals (No. 5) Order, which came into force on December 18th. This Order brings together in one document, with some amendments, the operative provisions of the four previous Non-Ferrous Metals Orders which are now repealed. Its most important feature is the new scale of maximum prices fixed for copper, lead and zinc and the consequent increases in the maximum prices of certain zinc products and varieties of non-ferrous scrap. These increases are necessitated partly by increased costs of freight and other charges and partly by the fact that the prices now quoted are for delivery at the consumer's premises whereas previously they were mainly on c.i.f. or ex-warehouse basis. The Order also sets out the circumstances in which the maximum prices may be varied for delivery in small lots, special shapes and sizes, &c., and empowers the Minister by special or general direction to prescribe what these variations shall be. Direction No. 1 which is issued with the Order fixes a scale of premiums for certain shapes and sizes of copper and provides for a discount in the case of copper cathodes. Copies of the new Order may be purchased from H.M. Stationery Office, or through any bookseller.

Tin Control

In pursuance of the Defence Regulations the Minister o Supply has issued the Control of Tin (No. 2) Order, 1939, date December 8th, revoking with effect from December 11th the Control of Tin (No. 1) Order of September 17th. The latter Order fixed maximum prices for tin on the basis of £230 per ton for standard tin, and the new Order removes this limitation. Copies of the new Order may be purchased from H.M. Stationery Office at York House, Kingsway, London, W.C.2, or through any bookseller.

Iron and Steel Imports

A Board of Trade Order (The Import of Goods (Prohibition) (No. 10) Order, 1939) came into force on December 18th adding to the list of the goods which require a licence for import, iron and manganese ores and the principal forms of iron and steel and certain materials used in the manufacture of iron and steel. The intention of the Order is to facilitate the purchase and transport of all necessary supplies of these materials and so far as is practicable importations will pass through the normal trade channels. Any goods covered by the Order which had been dispatched to the United Kingdom before the Order came into force will not requite a licence. Forms of application for licence may be had from the Import Licensing Department, 25, Southampton Buildings, Chancery Lane, London, W.C.2, or from the Iron and Steel Control, Steel House, Tothill Street, Westminster, S.W.1, where also importers may obtain information and advice.

Fluorescent Lighting in Wartime

Since the war started efforts have been made in various directions to use fluorescent powders and ultra-violet lighting in situations where normal lighting cannot be employed for reasons of safety. Provided the general black-out regulations are observed this form of lighting can be used in certain ways for A.R.P. purposes, and in addition there seems a good opportunity for employing it in such places as the foyers and lounges of cinemas, theatres and hotels, as well as in shopping arcades which are completely screened from overhead outside vision.

Various suggestions for its use are now to be seen at a new fluorescent lighting showroom opened at the headquarters of the General Electric Co., Ltd., at Magnet House, Kingsway, W.C.2. The centre-piece of the display represents a part of a cinema or theatre. A cash box and a programme board are suitably treated, while the stair treads, door architraves and other prominent features are clearly defined. Such things

Corner of the General Electric Co.'s fluorescent lighting showroom

as a lady's gown, a fluorescing table top, the tapestry seat of a chair, a fountain, an ornamental lilypond and rhodoid wall decorations, combine to produce a most attractive display. A striking exhibit in an adjoining room, an "Osram" lamp 8-sheet poster which has been treated with powder, suggests another use with great possibilities : a similar poster is now being displayed at King's Cross Station. The equipment employed in the showrooms consists of 125-W "black" "Osira" lamps in "Gecoray" reflectors. Two of these are in indirect lighting fittings, the rays being directed towards the ceiling from where they are reflected. Apart from the fluorescent lighting display the company is also demonstrating the new approved window lighting fittings, and one or two A.R.P. signs. With regard to the small boxes for general window lighting, the demonstration shows how, if the aperture is placed in the position indicated in the typical drawing published by the Ministry of Home Security, it is impossible to throw the light on to the goods without also directing it on to the pavement, which is forbidden. A little adjustment in the position of the slot, however, brings the light well down in the window without the possibility of any direct light striking the pavement. At first sight one might think that the 25-W lamp permitted in the window boxes would be more effective than the 15-W allowed in the display cabinets, but this is not so. The latter make a real display job, with which the general window lighting bears no comparison. A simple device is now available for converting any existing box sign to meet the present requirements.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable Making Industry announces that the cost of living figure on December 1st (73 per cent. above the 1914 level), will not involve any alteration in wages on the third pay-day in January.

Progress at Hornsey

A well-produced little brochure has been prepared by Mr. F. C. Orchard, the chief engineer and manager of the Hornsey Corporation Electricity Department, outlining the salient features in the growth of the undertaking during its thirty-six years of operation. The most recent step in the Department's development was the opening a few weeks ago of up-to-date new central offices and showrooms in The Broadway, Crouch End.

Bradford Charges Fail

A verdict of "Not guilty" was returned at Leeds Assizes in the case against a Bradford Corporation Electricity Department official, Arthur S. Rhodes, and a Bradford electrical contractor, Arthur N. Wilson. As we reported in our issue of November 10th the two men were accused of conspiracy and false pretences in connection with the payment of commission in respect of new consumers obtained for the Electricity Department. In announcing the jury's finding, the foreman said that they wished to make a comment on the slack manner in which accounts were checked for passing for payment out of public funds. In his summing up Mr. Justice Oliver had said that it was "a perfectly hopeless system" but was it dishonest? Rhodes might have had sufficient confidence in Wilson to pass his accounts in a summary way. That might have been carelessness or laziness, or have been due to the fact that he had not time to do his work properly but it was not dishonesty.

Wilson had made claims on the ground that he had distri-

buted literature and had canvassed people. It was for the jury to say whether Wilson honestly thought that he was entitled to commission.

Recent Contracts

Stuart Turner, Ltd., have recently supplied a number of portable generating sets to the Post Office. These are of 3 kVA, 230 V, separately excited, the engine being a twin-cylinder, 6-BHP, two-stroke type direct coupled at 1,500 RPM.

The company is experiencing an increasing demand for its small DC and AC plants, and recent orders include one for twenty-six 3-kW sets for the Central Electricity Board.

Christmas and New Year Holidays

The London offices of the Jackson Electric Stove Co., Ltd., will be closed from Saturday, December 23rd, until Thursday, December 28th.

In addition to closing on Christmas and Boxing Day, Brown Brothers, Ltd., inform us that their warehouses and offices at Great Eastern Street, London, E.C.2, will close at 1 p.m. on Wednesday, December 27th.

The works of Bruce Peebles & Co., Ltd., will close on December 29th and will reopen on January 4th. The head office (in Edinburgh) will be closed on December 25th.

Trade Announcemeuts

Sunbeam Commercial Vehicles, Ltd., informs us that an arrangement has been made whereby Commer-Karrier (Midland), Ltd., Great Hampton Street, Birmingham, 18 (Central 3993) will act as sole distributors for the sale of Sunbeam battery electric vehicles in Birmingham and the counties of Warwick, Worcester, Stafford and Salop. Commer-Karrier is also in a position to arrange demonstrations and to deal with both trade and retail inquiries.

The telephone numbers of the Crane Foundry Co., Ltd., Wolverhampton, have been changed to Wolverhampton 23624-5.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

CHEMICALS, ETC.	Price December 19th.	Fortnight's inc. or dec.
a Acid oxalic ... ... per cwt.	Suspended	—
a Ammoniac, Sal ... ... per ton		—
a Ammonia, Muriate (large crystal)... ,,		—
a Borax... ... ... ,,		—
a Copper, Sulphate ... ... ,,		—
a Potash Chlorate ... ... per lb.		—
a ,, Perchlorate ... ... ,,		—
a Shellac ... ... per cwt.		—
a Sulphur, Commercial ... ... per ton		—
a ,, Roll ... ... ,,		—
a Soda, Chlorate ... ... per lb.		—
a ,, Crystals ... ... per ton		—
a Sodium, Bichromate, casks ... per lb.		—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£94	—
b ,, Wire ... ... per lb.	1/3 to 1/9	—
b ,, Sheet and Foil ... ,,	1/4 to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£197	—
Grade II ... ... ,,	£137	—
Grade III ... ... ,,	£73	—
c Brass (rolled metal 2" to 12" basis)... per lb.	9¼d.	1d. inc.
c ,, Tubes (solid drawn) ... ... ,,	1/1½ to 1/1½	—
c ,, Wire, basis ... ... ,,	10½d.	1d. inc.
c Copper Tubes (solid drawn) ... ,,	1/2½d.	1d. inc.
g ,, Bars (best selected) ... per ton	£95	£10 inc.
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£51	—
d ,, ,, Wire Rods ... ,,	£55	—
d ,, ,, H.C. Wire ... per lb.	8½d.	—
f Ebonite Rod ⅛" dia. & up ... ... ,,	1/10 to 2/3 +10%	—
f ,, Sheet 1/16" thick & up ... ,,	1/4 to 1/8 adv.	—
n German Silver Wire, Nos. 1 to 12... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	Nom.	—
h India-rubber, Parafine ... ... ,,	1/1	1d. inc.
g Lead, English Pig ... ... ,,	Nom.	—
g Mercury ... ... per bot.	Nom.	—
e Mica (in original cases) small ... per lb.	1/3 to 3/–	—
e ,, ,, ,, medium ... ,,	9/– to 18/–	—
e ,, ,, ,, large ... ,,	20/– to 27/6	—
p Phosphor Bronze, plain castings ... ,,	1/2½	—
p ,, ,, drawn bars & rods ,,	1/2½	½d. inc.
p ,, ,, rolled strip & sheet ,,	1/0½	½d. inc.
p ,, ,, wire ... ... ,,	1/2½	½d. inc.
o Platinum ... ... per oz.	£10	—
d Silicium Bronze Wire ... ... per lb.	8½d.	—
g Spelter ... ... per ton	£25.15s.	£10.15s. inc.
g Tin, Block (English) ... ... ,,	£257.10s.	£27.10s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	4/9	6d. inc.

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in this section under the same heading.

Calendars and Diaries

"Juliet," the title of the charming picture which ornaments the calendar of the Standard Fuse Co., shows an attractive maiden upon the terrace of a country house.

British Insulated Cables, Ltd., has once again sent us its useful calendar showing the preceding, current and following months, together with the calendars for 1939, 1940 and 1941.

"The Gatecrasher" is the subject of the effective picture selected by G. E. Wallis & Sons, Ltd., for their 1940 calendar. This shows a young shepherd and his pet lamb, which is delving into the boy's lunch bag.

The calendar of Ruston & Hornsby, Ltd., has large monthly sheets, each of which illustrates places at home and abroad to which the company has supplied its oil engines.

The 1940 diary of the Electrical Power Engineers' Association is bound in green leatherette, and contains a great deal of technical data in concise form. A number of sheets of squared paper also add to its usefulness. A pocket is provided at the back for a season ticket.

Some excellent views, mostly of castles, in the British Isles illustrate the calendar for 1940 received from Evershed & Vignoles, Ltd., which has monthly tear-off sheets.

The calendar of C. A. Parsons & Co., Ltd., has large monthly sheets each of which bears an illustration of some of the larger turbo-alternators and generators and transformers supplied by the company to various authorities.

Lindsay & Williams, Ltd., have again sent us a wall calendar with large daily tear-off slips which have bold figures in red.

New Catalogues and Lists

Vactric, Ltd., Honeypot Lane, Stanmore, Middlesex.—A leaflet giving specifications of the new "Q.101" vacuum cleaner.

Brook Motors, Ltd., Empress Works, Huddersfield.—List 509, containing interesting facts regarding the manufacture and application of Brook electric motors.

B.M.B. Engineering Co., Britannia House, Ampton Street, London, W.C.1.—Leaflets describing the latest "Onan" petrol-driven generating sets for A.R.P. and other purposes.

Union Lamp & Lighting Co., Ltd., Abbeydale Road, Wembley.—A leaflet relating to "Glow Lamp" signs for shop windows, &c.

Frank Whitelegg, 90, Robinhood Lane, Sutton, Surrey.—List BH, describing the model "BH" hand-driven bobbin and electrical coil-winding machine.

Wm. Sanders & Co. (Wednesbury), Ltd., Falcon Electrical Works, Wednesbury, Staffs.—Particulars of the "Lytout" black-out door switch.

L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, Kingsway, London, W.C.2.—Literature relating to the new "Supreme" accumulator A.R.P. hand lamp and also shop-window lighting fittings and signs conforming with the new regulations.

Best & Lloyd, Ltd., Handsworth, Birmingham.—Leaflets relating to the "Best" crush shade and the "Best" travel standard for use with this shade, which can easily be packed for travel. This fitting converts a glaring light in the centre of the room to soft illumination on the table or at the bedside.

English Electric Co., Ltd., Stafford.—Publications relating to a machine tool lighting transformer (W51), Diesel engines for all purposes (W61), type "NS" 440-V, 20-A distribution fuseboards (W67), class "Agas" synchronous induction motors (W69), combination fuse-switches short-circuit making tests (W71), and portable transformers for safety handlamps (W84).

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, London, E.C.4.—Catalogue No. 471 of miscellaneous lighting equipment, including shop window reflectors, signs, time switches, flashers, watertight and bulkhead fittings, floodlighting equipment, and fittings accessories.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Catalogue section "X(3)" dealing with all types of automatic circuit breakers for power and lighting services up to 660 V.

Holophane, Ltd., Elverton Street, Vincent Square, London, S.W.1.—A leaflet pointing out the advantages of Holophane "Correctalite" reflectors for providing colour-corrected artificial lighting, especially in factories where daylight has been reduced by the partial black-out of windows and skylighting.

Sun Electrical Co., Ltd., 118-120, Charing Cross Road, London, W.C.2.—A list (No. 699) of "Sunco" electro-medical appliances for home and professional use.

Belling & Co., Ltd., Bridge Works, Southbury Road, Enfield.—A leaflet dealing with a new bed warmer.

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following :—

DAKOL colour matching lamp.

ELECTRICITY SUPPLY

Barnstaple Power Station Extension Inquiry. Purchase of Croydon Site. Municipal Trading Proposal at Fort William. Lichfield Reintroduces Hire-purchase

Barnsley.—10 PER CENT. INCREASE.—The Electricity Committee recommends a 10 per cent. increase in the charges to consumers.

INSTALLATIONS IN COUNCIL HOUSES.—It was recently reported to the Housing Committee that several tenants on the Carlton estate had applied for permission to enter into an agreement with Electrical Distribution of Yorkshire, Ltd., for the installation of electricity. Consideration was deferred pending the result of an inquiry among the tenants of other houses on the estate, and meanwhile the electrical engineer is being asked to quote for the cost of wiring all houses on the estate not provided with electricity.

Barnstaple.—INQUIRY INTO EXTENSION SCHEME.—An inquiry was held last week into an application by the Corporation for permission to borrow £12,655 for extending the generating station by the installation of a 600-kW set. The inquiry was conducted by Mr. H. Nimmo, chief engineering inspector of the Electricity Commission. Mr. S. Turner, K.C. (for the Corporation), said that the capacity of the station was 1,770 kW and the estimated maximum demand for next year was 1,720 kW. The growth of the load had been due to quite an exceptional demand for domestic supplies, particularly for cookers, and since the outbreak of war the progress had been well maintained. In March last, application was made to the Bideford & District Electric Supply Co. for a quotation for a bulk supply. The Corporation's consulting engineers had considered the offer and beyond a shadow of a doubt local generation was cheaper. Mr. Herbert Landon, of Messrs. Preece, Cardew and Rider, consulting engineers, expressed the view that under present conditions plant extensions would give the Corporation greater security. The installation of the plant now applied for would double the effective AC output of the station, and would be a contribution to the pool resources of the district. Mr. R. Robinson, borough electrical engineer, said that the total number of consumers was 3,900. In 1937-38 the Council generated 2,900,000 kWh, but in the following year the amount had jumped to 4,088,000 kWh. Regarding fuel supplies, he said the oil they were getting from the Petroleum Board was of a little better quality, which provided a set-off to the increase in the price of oil. He did not anticipate any difficulty in regard to supplies. The Inspector commented that salaries and wages of the Barnstaple undertaking appeared to be going down every year, a rather unusual experience. Mr. Robinson replied that when the station turned over from steam a number of stokers became redundant. They had now been superannuated. The Inspector asked Mr. W. J. Oxenham (Bideford Co.) if he intended to present a case for a bulk supply. Mr. Oxenham replied that he had no intention of doing so. Figures had been submitted, and he had nothing to add. The inquiry was closed.

Bath.—NO PRICE INCREASE THIS YEAR.—There will be no increase in the electricity charges during the current financial year. Making this announcement at a meeting of the City Council last week Coun. W. F. Long said that they had a rising revenue and rising trade, and they hoped that the curve of increased cost would not be so steep as to necessitate a rise in price.

Birmingham.—LOW-INTENSITY STREET LIGHTING.—Mr. H. J. Manzoni, city engineer and surveyor, stated last week that the extent to which the new low-intensity street lighting would be adopted in Birmingham would depend on the efficacy of the lighting in reducing accidents, and on the cost. According to the *Birmingham Post*, he said that although he had not studied the matter to the extent of getting out an estimate, obviously the expense must be considerable. There were 44,000 lamps in the city, of which 30,000 were gas. He doubted whether they could install the new lighting at a cost of less than £1 for each lamp.

Bridport.—LOAN FOR APPARATUS.—Consent has been obtained to loans of £4,000 for apparatus on hire, £2,000 for meters and £2,000 for consumers' wiring installations.

Chapel-en-le-Frith.—PROPOSED SUB-STATION.—The Rural District Council has approved plans for the erection of a sub-station in Ashbourne Lane, for the Trent Valley and High Peak Electricity Co., Ltd.

Conway.—NEW SUB-STATION.—The Town Council has authorised its electrical engineer, Mr. W. H. Hancock, to proceed with the erection of a sub-station at Gyffin. This will be fed from the high-voltage main in Sychnant Pass Road, and will improve the voltage at Gyffin and Hendre.

Croydon.—SITE FOR NEW POWER STATION.—Permission has been obtained to borrow £37,500 for the purchase of land for the proposed new generating station, £29,139 for mains and £9,000 for plant.

PRICE INCREASE.—The Electricity Committee recommends an advance of 20 per cent. in electricity tariffs. It is pointed out that the increased cost of coal this year is £14,000, while the estimated increase for 1940 will be £31,000.

Dewsbury.—PRICE INCREASES.—Advances in the price of gas and electricity were authorised at a recent meeting of the Town Council. The electricity charge to consumers taking supplies through lighting prepayment meters is to be increased by ½d. per kWh and the charges (including the standing charge for rateable value consumers) for electricity to all other consumers are being increased by 10 per cent.

Douglas (I.O.M.).—SUPPLY TO SCHOOL.—In connection with the supply to the Ballakermeen school, the Electricity Committee has authorised the electrical engineer to purchase a 150-kVA transformer and extend the mains at an estimated cost of £160.

Dover.—INCREASED CONSUMPTION.—In spite of lighting restrictions the output of the Electricity Department is higher than a year ago. Mr. R. G. Widgery, the borough electrical engineer, informed the Electricity Committee last week that the consumption was about 20 per cent. up. He mentioned that several large firms had recently been connected to the supply.

Fort William.—TRADING BY ELECTRICITY DEPARTMENT.—Arising out of a report by the electrical engineer, a proposal recently came before the Town Council that the Electricity Department should be permitted to sell electrical equipment. Councillor Macfarlane strongly contested such action, saying that it would put the Council in opposition to private traders. Councillor Wilson said that the Council was not running the Electricity Department for fun, but for profit, and he saw no reason why, if people desired it, they should not purchase from the Department. The matter was referred to the Lighting Committee.

Gillingham.—PROBLEM OF EVACUATION.—When the finances of the electricity undertaking were considered at a recent meeting of the Town Council it was stated that since the outbreak of war 3,000 houses had become untenanted. In addition, the cessation of operations by the Gillingham Cement Co. represented a gross loss to the undertaking of approximately £10,000, besides which the prices of fuel and materials had shown an all-round increase. It was estimated that there would be a deficiency of £4,678 on the current year's working. The Council, therefore, authorised increases in charges as from the next meter readings as follows: The standing charge under the rateable value tariff will be raised from 12½ to 15 per cent.; the annual charge to business premises of 16s. per 100 W lamp will be increased to £1; and meter rents will be reinstituted under the domestic two-part tariff.

Glasgow.—NEW LIGHTING ARRANGEMENTS.—The Corporation is going ahead as fast as possible with its preparations for relighting the streets on a modified scale. The convener of the Lighting Committee states that Glasgow will be the first city to have lighting under the new Order.

DEMONSTRATIONS RESUMED.—As an experiment the Electricity Committee has resumed the showroom demonstrations on two days each week.

Huddersfield.—CENTRAL CONTROL SYSTEM.—Approval has been given by the Finance Committee to a proposal of the Electricity Committee to install ripple control apparatus at the St. Andrew's Road power station.

Inverness.—DISPUTE SETTLED.—The Town Council at its last meeting unanimously approved the findings of the Electricity Committee in connection with the protracted dispute with the Electricity Commissioners over the application to install additional generating plant. The Commissioners advised the Council to take a partial bulk supply from the Grampian Electricity Supply Co., and the minutes showed that the matter has now been amicably adjusted between the Corporation and the company. It was agreed to defer consideration of the fees to be paid to Mr. S. B. Donkin, consulting engineer, for the report furnished by him on the partial bulk supply from the company and for work done in negotiating the draft agreement.

Ipswich.—NEW SUB-STATION.—The Electricity Committee is to provide a sub-station at Kesgrave at a cost of £1,050.

Lichfield.—DEVELOPMENT RETARDED.—That development had been retarded by the discontinuance of the hire-purchase scheme was reported at a meeting of the Electricity Committee, when the reintroduction of the scheme was considered. It was recommended that the immersion heater scheme should be continued and the normal hire-purchase scheme resumed, subject to the purchaser paying an initial deposit equal to at least 25 per cent. of the cost of appliances or fittings, the period for the payment of the balance to be left to the discretion of the electrical engineer.

SCHEME IN ABEYANCE.—In connection with the decision to take over the West Midland Joint Electricity Authority's undeveloped district around Yoxall, the town clerk reported that it would be necessary to seek a Special Order from Parliament

as a Fringe Order would not suffice. The Committee decided that owing to the war it could not proceed with this application, but would reconsider the matter when hostilities ceased.

Liverpool.—EFFECT OF REDUCED CONSUMPTION.—Mr. P. J. Robinson, city electrical engineer, has prepared a report on the considerable decrease in sales of electricity, mainly due to the black-out. Large consumers have already, it is reported, agreed to an increase in charges, and it is thought that an all-round advance in price may become necessary.

Nelson.—ELECTRICITY IN THE DAIRY.—Mr. T. D. Martin electrical engineer, states in his annual report that many farmers are now using electricity for sterilising purposes in the dairy.

Northern Ireland.—INCREASED OUTPUT IN BELFAST.—Last week the city electrical engineer reported to the City Council that sales of electricity between April 1st and November 28th showed an increase of 7.7 million kWh compared with the corresponding period of last year.

Portsmouth.—POWER STATION EXTENSION POSTPONED.—It was reported to the City Council last week that, in view of the substantial reduction in the demand for electricity, the Central Electricity Board had decided that the scheme for the extension of the generating station should be deferred.

ELECTRICITY TARIFF REVISION.—A number of increases in charges are recommended by the Electricity Committee. It is proposed to add 2s. per quarter to the floor-area charge under the domestic tariff and to make the running charge 0.6d. throughout the year. Under the business tariff (lighting) an increase of £1 per kW of maximum demand per annum is recommended. For power inside the city the scale will be raised from 1d./0.625d. to 1.2d./0.75d. and outside the city the new scale will be 1.25d./0.75d. The lighting flat rate in the city will be 5¼d. (¼d. increase) in the winter and 4½d. in the summer; outside the city the rate will be 6¼d.

Reading.—CONTRACTORS AND CANVASSING.—The canvassing of tenants of Council houses for electrical installations was recently discussed by the Electricity Committee, which has informed the Housing Committee that it does not consider it desirable that the wiring of Council houses should be carried out by private firms. The borough accountant and the electrical engineer and manager have been instructed to report on the operation of the Corporation's assisted wiring scheme in respect of Council houses in roads where mains are already laid.

Rushden.—OVERHEAD LINES.—Owing to the special circumstances arising from the war, the Urban District Council has agreed to permit the Rushden & District Electric Supply Co. to place overhead lines across Hall Avenue. The company will be required to remove the lines within three months of the cessation of hostilities and to indemnify the Council against all claims which may arise.

South Shields.—SCHEME ALTERED.—Following the decision of the Town Council to oppose the erection of overhead lines in Summerhill Road, the North-Eastern Electric Supply Co., Ltd., has announced its intention to lay underground cables.

Wallasey.—LOAN FOR HIRE-PURCHASE SCHEME.—Application is being made by the Electricity Committee for permission to borrow £5,370 for apparatus to be supplied on hire-purchase terms.

Wallsend-on-Tyne.—DISTRIBUTION EXTENSIONS.—The North-Eastern Electric Supply Co., Ltd., is to lay underground cables in Western Road, to the rope works of R. Hood Haggie & Son; and between Churchill Street and premises north of the golf course.

West Bromwich.—MAXIMUM DEMAND INDICATORS FOR SHOPS.—A decision to purchase 1,200 maximum demand indicators for installation in shops and business premises was reached at a recent meeting of the Town Council. Coun. Dyehouse said that since the black-out tradesmen had approached the Electricity Committee for some consideration, because they were not using as much light as before, and the outcome was this recommendation. He considered the scheme would work to the advantage of the tradespeople.

Overseas

Australia.—SNOWY RIVER PROJECT.—A conference has been held at Bombala, N.S.W., between representatives of New South Wales and Victorian municipalities with a view to developing the hydro-electric resources of the Snowy River. In a recent report to the N.S.W. State Government Messrs. Rendel, Palmer & Tritton, consulting engineers, London, put forward proposals for a hydro-electric scheme on the Snowy River between Jindabyne and Biddi Point to supply 300,000 HP, including transmission to Sydney over a distance of 265 miles. This scheme would make use of the fall of the river in N.S.W. territory. It is contended that equally good facilities are available for making use of the fall on the Victorian side, and it is with the object of developing such a scheme that the conference was called. The Monaro and East Gippsland country which would benefit by this scheme embraces 33,490 square miles, containing 22 shires and a population of 90,426. It is proposed to distribute energy around the coast from Eden to Bairnsdale.

India.—PROGRESS IN JAIPUR STATE.—Electricity is generated at 3.3 kV by oil-engine-driven plant at Jaipur power station, stepped up to 22 kV for transmission to Ramgarh and 11 kV to Sanganer, and distributed at 400 and 230 V AC. In 1938-39 the output was 5,000,000 kWh, of which 64 per cent. was used for lighting, fans and other domestic purposes, including water pumping. Jaipur State is in Rajputana, and has a population of 2,300,000.

NEW POWER STATION.—A new power-house has been completed by the Udwada-Vapi Electric Co., enabling a supply to be given to the town of Udwada. The station was officially inaugurated by the Minister of Public Works, Bombay.

Straits Settlements.—POWER PLANT AT SINGAPORE.—Despite the war the consumption of electricity in Singapore shows a tendency to increase, states the *Malaya Tribune*, which adds that if this continues new plant will have to be installed within the next two or three years.

Sweden.—PRODUCTION OF ELECTRICITY.—*Reuter's Trade Service* states that according to official statistics the production of electricity in Sweden in 1938 was 8,158 million kWh, an increase of 2.2 per cent. compared with 1937, the smallness of this expansion being due to a slight weakening in the industrial situation. The total capacity of generating plant in 1938 was 2,625,600 kVA against 2,454,300 kVA in 1937. Of the power produced about 7,305 million kWh, or 89.5 per cent., was generated at hydraulic stations and 853 million kWh, or 10.5 per cent., at thermal stations. The figures for the previous year were 6,971 million kWh (87.3 per cent.) hydraulic and 1,011 million kWh (12.7 per cent.) thermal. The total quantity of power used in 1938 was 7,168 million kWh against 7,066 million kWh in 1937, an increase of 1.4 per cent. This increase was the net result of a rise in four out of the six consumer categories, and an appreciable reduction in the most important group (large industries). The most striking increase in consumption (14.1 per cent.) was in the class including small industries, agriculture, and domestic use.

TRACTION

Cardiff.—TENDER FOR TROLLEY-BUSES.—The City Council has approved the acceptance of a tender of £14,334 for ten double-deck trolley-bus chassis, together with the necessary electrical equipment.

Huddersfield.—MORE TROLLEY-BUSES?—The Town Council has decided to apply to the Minister of Transport for a Provisional Order authorising the operation of two new trolley-bus routes.

London.—CHARING CROSS STATION REOPENED.—Last Friday the first Northern line train to run under the Thames between Charing Cross and Waterloo since the war started had among its passengers Captain Euan Wallace, Minister of Transport, and Lord Ashfield, chairman of the London Passenger Transport Board. Apart from the District line section, Charing Cross station was closed at the outbreak of war to allow engineers to complete the installation of floodgates. Normal services were restored on Monday last.

Manchester.—FLASHING ON OVERHEAD TROLLEY LINES.—Mr. C. H. Grindrod, chief electrical engineer of the Corporation Transport Department, writing in the *Passenger Transport Journal*, describes experiments carried out with various forms of shields, skates and electrically operated arc suppressors to reduce flashing on trolley-bus and tramway overhead systems. From test results obtained it was decided to produce four types of fittings, he states. The first of these, the slide or "by-pass" strip design, momentarily shorts the section insulator as a trolley wheel or shoe passes through. This type of fitting is being erected at half-mile sections and power supply points feeding both ways. A "hood" or "shield" design has been adopted for sections dividing sub-stations. The shield is fitted over the section insulator end suspension lugs. For section insulators on trolley-bus lines, particularly double insulated crossings at junctions, experiments have been undertaken with a view to eliminating or reducing the flash by electrical means. The apparatus chosen consists of a combination of shunt and blow-out coils operated by means of skids at the striking end of the section insulator. The flashing which takes place when trolley-buses or trams are negotiating frogs and crossings can be materially reduced if the drivers go through at a reduced speed. The fixing of a flat fibre shield 2 ft. by 1 ft. over a frog or crossing and bolted to the suspension eyes will prevent the flash being seen from above. The flashing at overhead electric automatic skates caused by the trolley-bus or tramcar operating the skates can be effectively overcome by installing a delayed action relay in the control box fitted on the span wire pole.

Suppression of flashing at suspension points, especially where round trolley wire is erected supported by clinched ears, is practically impossible, but the flashing is not so severe as at section insulators. The only remedy seems to be efficient maintenance. Mr. Grindrod expresses the opinion that the several methods adopted as an emergency measure for reducing overhead flashing may eventually be the means of consideration being given to improvement in the design of fittings whereby the life of renewable parts, which at present have a short life due to flashing and consequent burning, would be extended considerably.

Reading.—TROLLEY-BUSES PROVE PROFITABLE.—On May 21st the town's tram services were replaced by a fleet of 25 A.E.C. and English Electric trolley-buses, and the change is stated to be mainly responsible for the satisfactory results of the first half of the current financial year. During that period the undertaking made a profit of £5,578 as against £1,892 in the corresponding half of last year.

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and aoridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1938

4542. "Electron-discharge devices." Radioakt-Ges. D. S. Loewe. February 17th, 1937. (514938.)

5073. "Cathodes for gas or vapour-filled electric-discharge tubes." N. S. Oerensofi. February 18th, 1938. (515036.)

7067. "Multi-vibrator circuit arrangements." E. L. C. White. March 7th, 1938. (514940.)

8412. "Electrical control systems." C. J. Tagliabue Manufacturing Co. April 17th, 1937. (Addition to 512984.) (514990.)

8417. "Electric signalling systems." Standard Telephones & Cables, Ltd., and H. J. Ward. March 18th, 1938. (514991.)

8483. "Luminescent material." Marconi's Wireless Telegraph Co., Ltd. March 19th, 1937. (514889.)

8773. "Production of metallic screens by electro-deposition." L. Mellersh-Jackson. March 22nd, 1938. (515043.)

8883. "Circuit arrangements embodying cathode-ray oscillographs." A. D. Blumlein, J. Hardwick and C. O. Browne. March 23rd, 1938. (Cognate application 24411/38.) (515044.)

11404. "Electric transformer." British Thomson-Houston Co., Ltd. April 16th, 1937. (515890.)

11766. "Electrical signalling systems." Standard Telephones & Cables, Ltd., K. G. Hodgson and A. H. Roche. April 19th, 1938. (514893.)

11811. "Means for synchronising single or polyphase alternating-current systems." J. R. Perry. April 20th, 1938. (514943.)

12156. "Modulator circuit arrangements for high-frequency electrical signalling." Marconi's Wireless Telegraph Co., Ltd., and N. H. Clough. April 22nd, 1938. (515047.)

13287. "Electro-acoustic transmitters, electro-dynamic loudspeakers, and the like." H. Hughes & Son, Ltd., D. O. Sproule and A. J. Hughes. May 4th, 1938. (515090.)

14133. "Resistance elements." J. Collard. May 12th, 1938. (514997.)

14468. "Ground lamps for aerodromes." Chance Bros. & Co., Ltd., General Electric Co., Ltd., W. M. Hampton and S. S. Beggs. May 14th, 1938. (514949.)

14638. "Electric tumbler switches." J. A. Crabtree & Co., Ltd., H. F. McLoughlin and B. G. Harrison. May 17th, 1938. (514954.)

14792. "Pin-and-socket electrical couplings and heating elements connected thereto." Hague & McKenzie, Ltd., and G. E. Green. May 18th, 1938. (514899.)

14835. "Telephone instruments." J. E. Pollak (Associated Telephone & Telegraph Co.). May 18th, 1938. (514905.)

14840. "Electric lamps." British Thomson-Houston Co., Ltd. May 19th, 1937. (515091.)

14887. "Methods for the protection of electrical circuits and installations against short-circuit currents." Siemens-Schuckertwerke Akt.-Ges. May 25th, 1937. (Cognate application 14888/38.) (514916.)

14921. "Electric circuit-interrupters." Westinghouse Electric & Manufacturing Co. May 22nd, 1937. (514960.)

14987. "Electric-discharge devices." British Thomson-Houston Co., Ltd. May 22nd, 1937. (514967.)

14989. "Indicators for the rotary handles or adjusting members of thermostatic and other electric switches." C. A. Turner and Diamond H. Switches, Ltd. May 19th, 1938. (514922.)

15012. "Alternating-current voltage regulators." E. A. Hinksman and W. G. Gold. May 19th, 1938. (514972.)

15033. "Circulation devices for use with wash boilers." Siemens Electric Lamps & Supplies, Ltd., and J. F. Watkins. May 20th, 1938. (515007.)

15046. "Electric fires." Berkeley & Young, Ltd., and G. L. A. Grundon. May 20th, 1938. (515013.)

15096. "Circuit arrangements for supplying X-ray apparatus." General Electric Co., Ltd., and J. T. Caldwell. May 20th, 1938. (515055.)

15099. "Electric lamps, particularly miners' lamps." Concordia Electric Safety Lamp Co., Ltd., and C. C. Bleach. May 20th, 1938. (515016.)

15127. "Devices for nightly light-beaconing of high-tension overhead cables." Soc. Anon. pour les Applications de l'Electricité et des Gaz Rares Etablissements Claude, Paz & Silva. March 31st, 1938. (515017.)

15197. "Suspension devices for electric cables or flexible pipes or tubes." G. H. Collins and H. F. Collins. May 21st, 1938. (515024.)

15220. "Device for the oscillographic indication or recording of electric or mechanical variations." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. May 24th, 1937. (515027.)

15245. "Alternating-current measuring arrangements." Siemens & Halske Akt.-Ges. June 4th, 1937. (515032.)

15278. "Electric fittings having spring-loaded electric plunger contacts." Ward & Goldstone, Ltd., and S. Goldstone. May 23rd, 1938. (515096.)

15283. "Electron multiplier." Farnsworth Television, Inc. June 5th, 1937. (515097.)

15316. "Thermal electric switches." E. Hallowell. May 23rd, 1938. (515122.)

15325. "Electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd. May 21st, 1937. (515101.)

15339. "Electric drives and control systems for rolling-mills." Westinghouse Electric & Manufacturing Co. May 22nd, 1937. (515103.)

15342. "High-frequency oscillators." Marconi's Wireless Telegraph Co., Ltd., and N. Levin. May 23rd, 1938. (515063.)

15395. "Modulated carrier-wave transmitters." Marconi's Wireless Telegraph Co., Ltd. June 26th, 1937. (515106.)

15477. "Scanning oscillator circuit arrangements." Fernseh Akt.-Ges. May 24th, 1937. (515115.)

15484. "Loaded electric conductors for verbal communication cables." Solution Trust, Ltd. May 24th, 1937. (Cognate application 15485/38.) (515116.)

15487. "Electric traction arrangements." General Electric Co., Ltd., and E. H. Croft. May 24th, 1938. (515117.)

16916. "Supply system for electric-discharge lamps." R. H. Seaman, W. T. Wells and L. Spencer. June 7th, 1938. (515077.)

16926. "Electric gas-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabr. June 9th, 1937. (515078.)

17053. "Supporting and tensioning arrangements for thermionic filament cathodes." J. M. Doods and Metropolitan-Vickers Electrical Co., Ltd. June 8th, 1938. (515125.)

17054. "Supporting members for thermionic filament cathodes." C. H. Walker, J. H. Ludlow, J. M. Doods and Metropolitan-Vickers Electrical Co., Ltd. June 8th, 1938. (515126.)

17301. "Electric supply systems for loads capable of regenerative operation." British Thomson-Houston Co., Ltd., and A. L. Whiteley. June 10th, 1938. (514927.)

17319. "Electric cables." British Insulated Cables, Ltd., and J. L. Packer. June 10th, 1938. (515128.)

1939

1920. "Electrically heated grill-boiling plates." C. B. Backer. March 19th, 1938. (Divided out of 501181.) (515082.)

10793. "Light-projecting system." F. C. Walter. October 27th, 1938. (Divided out of 514201.) (514936.)

27265. "Means for automatically controlling the output voltage of a generator by means of inductances of infinitely variable value." J. R. Perry. April 20th, 1938. (Divided out of 514943.) (514986.)

TRADE MARK APPLICATIONS

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from December 13th :—

Elektron. No. 603423. Class 6 (IV). Soldering and welding metals, &c.—Magnesium Elektron, Ltd., Abbey House, Baker Street, London, N.W.1.

Vibrocon. No. 601188. Class 7 (IV). Electric generators, and motors for vibrators, &c.—Aktiebolaget Vibro-Betong, Stockholm, Sweden (British representatives, W. P. Thompson & Co., 12, Church Street, Liverpool).

Correction.—By a printer's error the phrase "heat insulating" was made to read "lead insulating" in our note on the mark "Siluminite" (No. 606483) in our December 1st issue.

Financial Section (*concluded from page 800*)

Reports and Dividends—contd.

the rental system, but the cessation of television broadcasts had completely stopped that business for the time being. In their normal business of renting radio sets and radiogramophones their estimated programme of development was accomplished. As to the effect of the war on their business, they had so far managed to carry on almost as usual and the number of subscribers who had terminated their agreements was considerably less than had been anticipated. Indeed, the demand for their services increased so much that within a few weeks they had replaced all those subscribers and they had since maintained a steady growth.

The Victoria Falls & Transvaal Power Co., Ltd., has declared an interim dividend of 4 per cent., less tax (same) on the ordinary shares, a dividend of 3 per cent. on the preference shares for the half-year ending December 31st, and a further dividend of 4 per cent., being participating rights for the year ending December 31st (same).

The British Vacuum Cleaner & Engineering Co., Ltd., reports a net profit for the year to September 30th of £29,783, as compared with £77,513 in the preceding year. Reserve receives £4,058 and the total ordinary dividend is 12½ per cent. (against 40 per cent. on smaller capital). The balance carried forward is £12,442 (against £13,717 brought in). The offer of 200,000 5s. ordinary shares at 20s. was fully subscribed and the share premium of £145,942 has been placed to reserve, making it £200,000.

The Buenos Aires Town & Docks Tramways reports a net profit for the year ended June 30th of £6,630, as compared with £20,300 in the previous year. The dividend for the year is 2 per cent. (against 3 per cent.), and £1,193 is carried forward (against £999 brought in).

Marconi's Wireless Telegraph Co., Ltd., has announced a final dividend of 3½ per cent. cumulative participating preference shares.

The Compania Hispano Americana de Electricidad (Chade) is paying an interim dividend of M$n. 22.50 on "A," "B" and "C" shares, and M$n. 4.50 on "D" and "E" shares.

The London Electrical & General Trust is paying an interim dividend of 2 per cent. (against 2½ per cent.).

Greenwood & Batley, Ltd., have declared an interim dividend of 3 per cent. (same).

FINANCIAL SECTION

New Companies. Returns of Capital. Debenture Charges. Bankruptcies and Liquidations. Reports of Electrical Companies. Dividend Announcements. Stocks and Shares

New Companies Registered

Rival Lamps (Holdings), Ltd.—Private company. Registered December 14th. Nominal capital, £16,000. Objects: To acquire the whole or any part of the issued share capital of Rival Lamps, Ltd., and to act as an investment trust and holding company, &c. Power is also taken to carry on either directly or through any subsidiary company, the business of manufacturers, importers and exporters of, agents for and dealers in electric and incandescent lamps, bulbs, wireless valves, neon signs, &c. Directors: J. F. H. C. E. Engelen, 49, Haling Park Road, South Croydon, A. F. H. M. Engelen, 110B, Beulah Hill, S.E.19, and three others. Solicitors: Warren & Co., 45, Bloomsbury Square, W.C.1.

British Electrical Element Co., Ltd.—Private company. Registered December 9th. Capital, £1,000. Objects To carry on the business of manufacturers of and dealers in electric lamps, fires, stoves, cookers, switchboards, fans, armatures, insulators and electrical appliances and accessories, electrical engineers and consultants, &c. The first directors are C. L. Grimwood (permanent), 32, Copse Avenue, West Wickham, Kent, and such other directors as he shall appoint. Secretary: C. L. Grimwood. Registered office; 54, City Road, E.C.

W. & E. Kupfer, Ltd.—Private company. Registered December 13th. Capital, £3,000. Objects: To carry on business as exporters, importers and manufacturers of and dealers in all kinds of electrical and other equipment for heating, lighting, power, &c. Subscribers: S. J. B. Lancashire, 43, Cambridge Road, E.11, and G. E. Sewell, 194, Odessa Road, E.17. Solicitors: Daphnes & Co., 10, Charterhouse Square, E.C.1.

J. D. McCarthy, Ltd.—Private company. Registered December 15th. Capital, £500. Objects: To carry on the business of contractors and electricians, mechanical engineers and manufacturers and workers of and dealers in electricity, &c. The permanent directors are: J. P. Westfield, Bramber Court, Penhill Road, Lancing, Sussex, and E. N. Westfield, 14, Sedbury Road, Sompting, Sussex.

Electro Physical Laboratories (Renny & Wender), Ltd.—Private company. Registered December 18th. Capital, £8,000. Objects: To carry on the business of manufacturers of and dealers in scientific instruments, apparatus and appliances of all kinds; to enter into contracts or arrangements with or on behalf of any government or authority, firm, company or person, for the supply or hire of any such goods, &c. The subscribers are: F. Willis, 57, Creighton Avenue, N.10; and E. B. Godfrey, 117, Addington Road, West Wickham, Kent. Solicitors: Bischoff Coxe & Co., 4, Great Winchester Street, E.C.

Charles Moray & Co., Ltd.—Private company. Registered December 16th. Capital, £20,000. Objects: To carry on the business of mechanical, constructional, electrical and general engineers, founders, iron and steel manufacturers, &c. The subscribers are: C. C. Algar and A. J. Clark, both of 34, Bishopsgate, E.C.2. Solicitors: F. R. Stephen & Co., 34, Bishopsgate, E.C.2.

Companies' Returns

Statements of Capital

British Ferrocart Co., Ltd.—Capital, £100 in £1 shares. Return dated June 20th. All shares taken up. £100 paid. Mortgages and charges nil.

Hewittic Electric Co., Ltd.—Capital, £50,000 in 1,400 redeemable preference and 48,600 ordinary shares of £1. Return dated August 11th. 1,400 preference and 40,000 ordinary shares taken up. £40,000 paid on the ordinary shares, £1,400 considered as paid on the preference shares. Mortgages and charges nil.

Linealux, Ltd.—Capital, £1,000 in £1 shares. Return dated October 28th. 502 shares taken up. £502 paid. Mortgages and charges nil.

Wholesale Electrical Supplies (Salford), Ltd.—Capital, £3,000 in 2,000 preference and 1,000 ordinary shares of £1. Return dated September 29th. 1,000 ordinary shares taken up. £1,000 paid. Mortgages and charges: £2,500.

Philips Lamps, Ltd.—Capital, £100,100 in 100,000 ordinary and 100 "B" shares of £1. Return dated November 16th. All shares taken up. £100,100 paid. Mortgages and charges nil.

T.M.C.-Harwell (Sales), Ltd.—Capital, £15,000 in £1 shares. Return dated August 10th. 10,000 shares taken up. £10,000 paid. Mortgages and charges nil.

Johnson Electricals, Ltd.—Capital, £100 in £1 shares. Return dated August 10th. Four shares taken up. £4 paid. Mortgages and charges nil.

Dean & Noble, Ltd.—Capital, £1,000 in £1 shares. Return dated September 13th. All shares taken up. £1,000 considered as paid. Mortgages and charges nil.

Key & Dawson, Ltd.—Capital, £1,000 in £1 shares. Return dated October 5th, 1939. 290 shares taken up. £290 paid. Mortgages and charges nil.

Long & Carter, Ltd.—Capital, £1,300 in £1 shares. Return dated October 16th, 1939. 1,300 shares taken up. £800 paid. £500 considered as paid. Mortgages and charges nil.

H. A. Lee, Ltd.—Capital, £1,500 in £1 shares. Return dated October 23rd, 1939. 1,425 shares taken up. £625 paid. £800 considered as paid. Mortgages and charges nil.

A. W. Grantham, Ltd.—Capital, £1,000 in £1 shares. Return dated October 25th, 1939. All shares taken up. £500 paid. £500 considered as paid. Mortgages and charges nil.

C. F. Casella & Co., Ltd.—Capital, £17,000 in 2,000 preference and 15,000 ordinary shares of £1. Return dated November 18th, 1939. 2,000 preference and 12,204 ordinary shares taken up. £3,504 paid. £10,700 considered as paid. Mortgages and charges nil.

Mortgages and Charges

English Electric Co., Ltd.—Satisfaction to the extent of £21,500 on November 15th, 1939, of 4 per cent. debenture stock secured by trust deed dated May 7th, 1936, and registered May 12th, 1936.

General Pneumatic Appliances, Ltd.—Mortgage on land and premises fronting Harper Road, Northenden, Manchester, dated November 15th, 1939, to secure £4,000 and any arrears of interest which may be capitalised. Holders: Corporation of Manchester.

Pullars Electric Co. (Brighton), Ltd.—Satisfaction to the extent of £3,600 on November 8th, 1939, of debentures authorised June 14th, 1932, registered July 30th, 1932.

Express Magneto (Repairs) and Electrical Co., Ltd.—Satisfaction in full on September 14th, 1939, of the four mortgages, the debenture and a resolution of the shareholders, dated August 3rd, 1927, June 20th, 1929, October 3rd, 1932, October 3rd, 1932, March 29th, 1934 and April 7th, 1934, and registered August 9th, 1927, June 25th, 1929, October 5th, 1932, October 5th, 1932, April 13th, 1934, and April 13th, 1934, respectively.

Increases of Capital

Arc Manufacturing Co., Ltd.—The nominal capital has been increased by the addition of £27,500, beyond the registered capital of £10,000. The additional capital is divided into 17,500 5 per cent. non-redeemable preference and 10,000 ordinary shares of £1 each.

Clear Hooters, Ltd.—The nominal capital has been increased by the addition of £1,000, in £1 shares, beyond the registered capital of £4,000.

Company Liquidations

Hendon Electric Supply Co., Ltd.—Winding up voluntarily. Liquidator, Sir James Devonshire, Northmet House, Southgate, London, N.14. Particulars of claims to the liquidator by December 30th. This notice is purely formal. All known creditors have been, or will be, paid in full.

Electric Motors Development Co., Ltd.—Winding up voluntarily. Liquidator, Mr. M. Moore, Thames House, Queen Street, London.

Newbury Radio Co., Ltd.—Particulars of claims by January 1st to Mr. C. Latham, 185-88, High Holborn, London, W.C.1, and Mr. C. S. S. Cowper, 14A, Northbrook Street, Newbury.

Handover, Ltd.—Winding up voluntarily. Liquidator, Mr. A. E. Quaife, 104, High Holborn, W.C.1.

Bankruptcy Proceedings

H. P. Ansell, electrical consultant, trading in partnership with others as H. P. Ansell & Partners, also trading in partnership with others as Engineering Services, at First Avenue House, High Holborn, London, and lately trading in partnership with others as H. P. Ansell & Partners at City Chambers, Broad Street, Birmingham.—Trustee, Mr. L. A. West, Bankruptcy Buildings, Carey Street, W.C.2, Senior Official Receiver, released December 8th.

E. P. Hallybone, radio dealer and electrical engineer, 15, Kneesworth Street, Royston, Herts.—First and final dividend of 3s. 0½d. in the £, payable at 41, Sidney Street, Cambridge.

D. B. Jones, electrical contractor, 1, Tireithin, Llwynhenry, Llanelly.—Receiving order made December 8th on debtor's own petition.

M. F. Clifford and **D. T. Hill** (Clifford and Hill), radio dealers, 69, Longmore Street, Balsall Heath, Birmingham, and 149, Sand Pits, The Parade, Birmingham.—Trustee, Mr. R. K. Clark, 37, Temple Street, Birmingham, Official Receiver, released November 23rd.

G. E. Hughes, electrical engineer, 90, Gibbet Street, Halifax.—Last day for receiving proofs for dividend January 1st. Trustee, Mr. W. F. Cresswell, 71, Manningham Lane, Bradford, Official Receiver.

J. J. Glover, electrical contractor, 24, Market Place, Reading.—First and final dividend of 6s. 4d. in the £, payable at 8, Forbury, Reading.

Reports and Dividends

The General Cable Manufacturing Co., Ltd., held its annual meeting on December 15th, when Mr. C. W. R. Pantlin (chairman), who presided, said that the result of the year under review was more than satisfactory and had been obtained by an increased production, together with a successful sales campaign. Uneconomic competition had been experienced, but not quite to the same extent as in the previous twelve months. It was their policy to look after their own customers as far as they could, but of necessity the requirements of the Government must have priority. Their entire output was absorbed for some time ahead and they were likely to have a record year, both as regards turnover and profit. They would not, however, benefit by any great extent if that was the case as the excess profits tax, together with a heavy income tax, would dissipate the greater part of any additional profits that might be made.

Crompton Parkinson, Ltd.—At the annual meeting of this company held on December 15th a resolution was passed converting all issued shares of all classes into stock. An abstract of Mr. F. Parkinson's address, which had been circulated before the meeting, was published in our issue of December 8th.

Radio Rentals, Ltd.—Presiding at the annual meeting on December 14th Mr. H. F. Hunt (chairman) said that the year under review was much more satisfactory than the previous one. They entered the television market with an excellent instrument and there were signs that in this new field there was ample and ready scope for the development of

(Continued on page 799.)

STOCKS AND SHARES

TUESDAY EVENING.

THE week before Christmas, and the week afterwards, are not held as a rule to be particularly favourable times for activity in Stock Exchange markets. The present year shows no disposition to break away from regular routine. Prices in most markets are very steady. The cheering naval news at the beginning of the week undoubtedly exercised an influence in the direction of encouraging confidence. Under the present system of cash dealings, the Stock Exchange markets lose most of the usual buying by speculators who hope to make a profit by selling at higher prices when the year has turned.

In the new issue market, last week's offer of a substantial loan by the Commonwealth of Australia resulted in the underwriters being left with 62 per cent. of their obligations. This made prices temporarily dull, but the effect soon wore off and the quotations for gilt-edged stocks, while showing slight declines on balance, exhibit a good deal of firmness. The best class industrials are as scarce as ever to come by. Cable and Wireless stocks hold most of the improvement which they had previously secured.

Gilt-edged Stocks

Any possibility of a new defence loan flotation before the end of the year is virtually ruled out by the seasonal diversion of interest from business matters. Current defence expenditure of about £6 millions a day is, of course, being financed to a large extent by means of short-term loans in the shape of Treasury Bills, &c. There is, it goes without saying, a limit beyond which borrowing on these lines cannot safely be raised, and where the funding of the debt into a more permanent form becomes imperative. How far matters have approached the limit cannot be judged. Most people look for an early alteration in the policy of short-dated borrowing. Meanwhile, the gilt-edged market keeps on an even keel, and the dearth of first-class debenture and preference stocks is unrelieved. Among public board issues, London Transport 5 per cent. "B" stock has declined from 105½ to 103½, and the 4½ per cent. "A" stock from 107½ to 105½. Central Electricity Board 3½ per cent. stock, 1963-93, has been in demand up to 90.

Electricity Supply

Shares in the electricity supply companies are changing hands only occasionally at about the prices to which the market settled down some weeks ago. News of the coming introduction of dim street lighting failed to brighten the group. Inquiries come along every now and then for the London companies' higher-yielding shares, as being among those in which the war-risk has been discounted, and which promise recovery when events get back to normal. A certain amount of money is seeking safe investment in such shares as Midland Counties, Edmundsons and Scottish Power, these companies being considered likely to maintain their positions satisfactorily in wartime. London Associated are better at 19s. 6d. Llanelly Electrics, at 19s., have risen 1s. Among the overseas companies, Perak Hydro Electrics have changed hands over £1, and Nigerian Electrics have advanced from 13s. 9d. to 15s. 5d., the reason in each case being the rising activity at the tin mines supplied with electric power by these companies. British Columbia Power "A" shares are attracting some interest at around $30 on Canadian prospects.

Communications and Transport

Such profit-taking as might have been expected to follow the abrupt ascent of Cable and Wireless stock prices has done little to disturb the firmness of these issues. At 57½, the ordinary remains at the best level of the year; the preference and income stocks, at 92½ and 93½, respectively, have lost a trifle of this month's substantial improvements. Great Northern Telegraphs, at 20½, remain weak, under the influence of the Scandinavian position. Shares have changed hands as low as 18. Home Railway stocks hold their higher prices, despite the absence of a decision as to the terms to be paid by the Government in compensation for the wartime use of the lines. In the foreign group, Brazilian Tractions are again harder at 10½, while Rio Tramways 5 per cent. bonds have followed their habit of moving not less than five points at a time, in jumping to 80. Mexican Light & Power bonds are 2½ higher at 30.

Crompton Parkinson

Referring to the 20 per cent. distribution for the year, the chairman of Crompton Parkinson reminded shareholders, at the annual meeting, of the new dividend policy which aims at regular 15 per cent. payments, with cash bonuses added when justified by the circumstances. It was realised, said Mr. Frank Parkinson, that the year's profits were being distributed on a very conservative scale, for which the justification was not only the uncertainty of future taxation, but the problem of post-war conditions. Shareholders were told that the great capital expenditure of recent years on plant and equipment is enabling the company to contribute substantially to the national effort. No change has occurred, since the meeting, in the price of the 5s. shares, which stand as 17s. 6d. to return just under 5¾ per cent. on the money.

Stock on Offer

English Electric 6½ per cent. cumulative preference shares are offered in the market at 27s. 3d., to yield £4 15s. 3d. per cent. on the money. Payment of the dividend takes £73,830 annually, and was covered more than eight times over by last year's available profits. The next dividend date is March 1st. Also obtainable at present are the well-secured Crompton Parkinson 6 per cent. cumulative preference shares at 25s. 6d., yielding £4 14s. per cent.; and Siemens 10 per cent. preference at 37s. 6d., on which the return is £5 6s. 9d. per cent. Among debentures, Wessex 3¾ per cent. stock is available at 96¾, to yield £3 17s. 6d., or nearly 4 per cent., allowing for redemption in 1959. South London 4½ per cents., 1965/72, can be bought at 106½ to yield £4 2s. 6d. to redemption.

Equipment and Manufacturing

The industrial markets continue to display a firm front, relieved here and there by points of particular interest. Events or announcements affecting individual companies generally cause the appropriate reaction in the shares concerned; otherwise, prices are marking time, the absence of sellers and consequent shortage of stock contributing to the underlying strength. Buyers of shares connected with the electrical industries are showing persistent interest in Reyrolles and Tube Investments, both of which have this week added half-a-crown to the previous advances. Reyrolles are now £3—nearly the highest price of the year—against 53s. 9d. a month ago. Tube Investments, at 88s. 9d., have risen 3s. 9d. in a fortnight. Lucas, at 56s. 3d., are $\frac{1}{16}$ better. Hopkinsons have continued on the upgrade to 42s. 6d., being 5s. higher than a fortnight ago, and Ever Ready have hardened to 25s. 6d., the best price of the year. International Combustions, at 5¾, are 10s. to the good. The report is due next month. The electrical equipment market is not without its dull spots. Associated Electricals, at 38s. 9d., English Electrics, at 31s. 3d., Ericsson Telephones, at 35s., and Revo Electrics, at 21s. 3d., all being lower.

Taxation

Every now and then, company reports give the holder of ordinary shares a reminder that wartime taxation is an unknown quantity which is liable to play tricks with the estimation of profits and dividends. It has to be recalled that the provision for Income Tax and the Excess Profits Tax shown in the company's accounts is an estimate, by the company, of its liability; the amount will very likely differ from the sum eventually assessed by the revenue authorities. So far as the majority of public companies is concerned, it is generally safe to assume a conservative view of the liability. Greatly increased provision for taxation is responsible for the cut in the Turner and Newall dividend, from 20 to 15 per cent., in the face of record trading profits, and for a fall of about 7s. in the price of the shares to 67s.

Foreign Securities

A note on dealings in foreign securities may help to clear up some prevailing uncertainties in the minds of investors. The Government decree ordering the registration of foreign securities (those on which interest or capital is or can be paid in the principal foreign currencies), provided the Treasury with the data which will be needed in the event of a mobilisation of these assets. Such mobilisation would have the effect of making dollars, etc., available for the purchase of war-essentials abroad. In the last war, the mobilisation was carried out on the fairest of lines, from the holders' point of view. The prospect of another and similar operation seems no deterrent to keeping stock for the present.

Anyone now selling stock abroad, and receiving payment in foreign currency, has to hand over the proceeds to the Treasury, receiving the appropriate amount of sterling at the ruling rate of exchange. Purchases of foreign securities are forbidden if they involve payment in a foreign currency, since the latter is not available to British nationals, and sterling may not be exported. Stock may, however, be bought from another British holder when the transaction does not involve the necessity for money to leave the country. Dealing is, therefore, allowed—and is, indeed, carried on moderately actively—in the more popular American and other stocks which normally command a free market in this country.

Fashions in Finance

The dislike on the part of investors to preference shares standing at a premium over the nominal value, is wearing off. Some time ago it was a decided factor amongst other considerations which weighed with the investor in the disposal of his money. At the back of his mind there lurked the vague apprehension of having the shares paid off at the nominal value, thereby incurring capital loss. These fears have now completely subsided, and the electricity supply market can produce a number of preference shares that stand at a good premium, and for which, nevertheless, a steadily constant demand exists.

At the moment there happen to be on offer in the market a line of British Power and Light 6 per cent. Preference shares at 26s. 3d., to pay £4 11s. 6d. Dividends are due on April 1st and October 1st. To pay the annual dividend on these shares takes £43,875. The net profit last year was £154,000 and £66,000 was brought in from the previous year. In each of the three previous years the company's profits provided ample cover for the dividend service. It has no debenture debt.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1939 High-est	1939 Low-est	Dividend Pre-vious	Dividend Last	Price Dec. 19	Rise or Fall	Yield £ s. d.
Home Electricity Companies							
Bournemouth and Poole	68/3	57/–	15	15	58/9	—	5 2 0
British Power and Light	30/9	21/–	7	7	26/–	—	5 7 8
City of London	33/9	23/6	7½	7½	25/6	+6d.	6 0 0
Clyde Valley	37/9	27/6	8	8	33/3	—	4 16 3
County of London	46/9	28/–	10½	10½	36/3	—	5 16 0
Edmundson's :							
7% Pref.	31/6	27/6	7	7	28/–	—	5 0 0
Ord.	27/9	18/6	9	6	23/6	—	5 2 2
Elec. Dis. Yorkshire	41/6	32/6	9	9	35/9	—	5 0 5
Elec. Fin. and Securities	47/9	40/–	12½	12½	40/–	—	6 5 0
Elec. Supply Corporation	51/9	41/–	12	12	41/3	—	5 16 0
Isle of Thanet	20/–	15/–	4	4	15/–	—	5 6 8
Lancs Light and Power	34/6	25/–	7½	7½	28/9	—	5 4 4
Llanelly Elec.	22/6	17/6	5½	5½	19/–	+1/–	5 15 9
Lond. Assoc. Electric	30/–	18/3	7	7	19/6	+9d.	7 3 7
London Electric	34/3	22/6	7	7	25/–	—	5 12 0
London Power Deb. Red.	106½	98	5	5	103½	—	4 16 6
Metropolitan	51/–	35/–	12	12	37/–	—	6 9 9
Midland Counties	38/9	30/–	8	8	35/–	—	4 11 5
Mid. Elec. Power	41/9	35/–	8	9	36/3	—	4 19 4
Newcastle Elec.	28/9	26/–	7	7	26/3	—	5 6 8
North Eastern Electric :							
Ordinary	32/3	23/6	7	7	27/6	—	5 1 10
7% Pref.	32/6	27/6	7	7	30/–	—	4 13 4
Northampton	48/–	41/–	10	10	42/6	—	4 15 0
Notting Hill 6% Pref. (£10)	12½	11½	6	6	11½	—	5 4 4
Northmet Power :							
Ordinary	46/6	30/6	10	10	37/–	–6d.	5 8 1
6% Pref.	29/–	23/6	6	6	27/–	—	4 9 0
Richmond Elec.	29/–	21/6	7	7	23/9	—	5 18 0
Scottish Power	38/9	28/6	8	8	32/6	—	4 18 6
Southern Areas	22/9	17/–	5	5	18/–	—	5 11 1
South London	30/9	23/9	7	7	22/–	—	6 7 3
West Devon	23/3	18/9	5	5	18/9	—	5 6 8
West Glos	21/3	16/3	2	2½	16/3	—	3 1 6
Yorkshire Elec.	38/6	28/9	8	8	33/9	—	4 14 10
Overseas Electricity Companies							
Atlas Elec.	4/3	1/6	Nil	Nil	3/–	—	—
Calcutta Elec.	39/–	25/–	10*	10*	30/6	—	—
Cawnpore Elec.	34/6	28/3	10	10	27/6	—	—
East African Power	26/3	20/–	7	7	23/6	—	5 19 2
Jerusalem Elec.	24/6	21/–	7	7	21/–	—	6 13 4
Kalgoorlie (10/–)	10/6	9/–	7½	7	10/–	—	7 0 0
Madras	31/–	21/3	8*	8*	21/3	—	—
Montreal Power	35½	30	1½	1½	33½	—	—
Palestine Elec. "A"	29/6	20/–	7½*	5*	23/9	–1/6	4 4 0
Perak Hydro-electric	19/6	13/6	6	2½	19/6	+9d.	2 11 4
Shawinigan Power	25	20	85cts.	83cts.	25	—	—
Tokyo Elec. 6%	63	37	6	6	57½xd.	—	10 8 8
Victoria Falls Power	73/9	60/–	12½	15	67/6	–1/6	4 8 9
Whitehall Investments Pref.	19/6	12/6	7½	7½	14/–	—	10 14 2
Public Boards							
Central Electricity :							
1950–70	112	103	5	5	106½	—	4 14 0
1955–75	115½	104½	5	5	108	—	4 12 6
1951–73	106½	101	4	4½	103	—	4 7 3
1963–93	95½	84	3½	3½	90	+1	3 18 7
London Elec. Trans. Gtd.	88½	83	2½	2½	87	—	2 17 6
London & Home Counties							
1955–75	107½	105	4½	4½	107	—	4 4 1
Lond. Passenger Transport :							
A	114½	103	4½	4½	105½	–2	4 5 4
B	117½	102	5	5	103½	–2	4 16 9
C	83½	64½	4	1½	65	—	2 6 2
West Midland Joint Elec.,							
1948–68	112½	104½	5	5	106	—	4 14 4
Telegraph and Telephone							
American Tel. & Tel.	210	159	9	9	205½xd.	—	4 7 8
Anglo-Am. Tel. :							
Pref.	101½	82	6	6	92½	—	6 9 9
Def.	23⅜	18½	1½	1½	21½	—	6 19 6
Anglo-Portuguese	24/–	17/6	8	8	20/–	—	8 0 0
Cable & Wireless :							
5½% Pref.	95½	75	4½	5½	92½	–1	5 19 0
Ord.	57½	34	4	4	57½	—	6 19 2
Income	100	87½	—	—	91½	–1	4 7 5
Canadian Marconi $1	6/–	3/9	—	Nil	5/–	—	—
Globe Tel. & Tel. :							
Ord.	31/3	23/6	7½*	7½*	27/6	—	5 9 1
Pref.	26/9	22/6	6	6	25/–	—	4 16 0
Great Northern Tel. (£10)	38	18½	20	20	20½	—	9 15 2
Inter. Tel. & Tel.	10½	5½	Nil	Nil	5	–½	—
Marconi-Marine	30/–	23/–	7½	10	26/3	—	7 12 4
Oriental Telephone Ord.	2½	46/3	12*	12*	2 5/16	—	5 4 0
Radio Corpn.	8⅞	5¾	8	6	7½	—	—
Telephone Props.	14/–	12/9	5	6	13/9	—	8 14 6
Telephone Rentals (5/–)	10/–	7/–	10	10	8/–	—	6 5 0
Western Union	40½	19½	2¾	—	32½	–3	—
Traction and Transport							
Anglo-Arg. Trams :							
First Pref. (£5)	7/6	3/6	Nil	Nil	5/–	—	—
4% Inc.	16	5	Nil	Nil	10	—	—
British Electric Traction :							
Def. Ord.	1025	515	5	5	700	—	—
Pref. Ord.	164	130	8	8	142	—	5 12 8
Bristol Trams	52/6	36/3	8	10	42/–	—	4 15 5
Brazil Traction	13	7½	$1	50c.	10½	+¼	—
Calcutta Trams	25/6	20/9	8	8	21/3	—	7 10 6
Cape Elec. Trams	18/–	16/9	5	5	17/–	–6d.	5 17 8
Lancs Transport	37/9	27/6	10	10	30/–	—	6 13 4
Mexican Light :							
1st Bonds	28	20	5	5	30	+2½	—
Rio 5% Bonds	82	47	5	5	80	+5	6 5 0
Southern Rly. :							
5% Prefd.	75½	48	5	5	65	—	7 13 9
5% Pref.	99½	79	5	5	89	—	5 12 4
T. Tilling	2½	32/6	10	10	38/9	—	5 3 3
Tilling & B.A.	54/6	43/9	10	9*	45/–	—	4 2 3
West Riding	37/9	30/–	10	10	30/–	—	—
Equipment and Manufacturing							
Aron Electricity Ord.	32/3	22/6	15	15	22/6	—	—
Assoc. Elec. :							
Ord.	45/3	31/3	10	10	38/9	–1/6	5 3 0
Pref.	36/6	31/3	8	8	32/6xd.	+6d.	4 18 6
Automatic Telephone & El.	47/6	39/3	10	12½	42/6	—	5 17 8
Babcock & Wilcox	48/–	37/–	10	12½	40/9	—	6 2 7
British Aluminium Ord.	58/9	48/9	12½	12½	50/–	–9d.	5 0 0
British Insulated Ord.	88/–	72/6	20	20	80/–	—	5 0 0
British Thermostat (5/–)	16/–	12/–	18½	18½	12/6	—	7 8 0
British Vacuum Cleaner (5/–)	22/6	12/6	40	12½	12/6	—	—
Brush Ord.	5/9	3/9	Nil	Nil	4/–	+3d.	—
Callender's	92/–	52/6	20	15	60/–	—	5 0 0
Chloride Elec. Storage	82/3	62/6	20	15	3½	—	4 5 9
Consolidated Signal	96/–	62/6	36½	36½	65/–	—	9 14 8
Crabtree (10/–)	25/6	17/6	17½	17½	21/3	—	8 4 9
Crompton Parkinson :							
Ord. (5/–)	21/–	12/6	15	20	17/6	—	5 14 3
E. K. Cole (5/–)	9/–	3/–	10	Nil	4/–	—	—
Elec. & Musical Industries (10/–)	14/9	7/–	5	Nil	7/6	+6d.	—
Electric Construction	38/6	31/–	12½	13½	33/9	—	8 0 0
Enfield Cable Ord.	58/6	42/6	25	16½	46/3	—	7 0 5
Electrical Switchgear (10/–)	27/–	21/–	16	10	21/3	—	4 14 3
English Electric	36/6	25/–	10	10	31/3	–1/6	6 8 1
Ensign Lamps (5/–)	16/9	13/9	25	25	15/–	—	8 6 8
Ericsson Tel. (5/–)	43/–	35/–	25*	25*	35/–	–⅛	3 11 5
Ever Ready (5/–)	25/6	18/–	35	30	25/6	+6d.	5 17 8
Falk Stadelmann	27/–	17/6	10	6	18/9	—	6 13 4
Ferranti Pref.	25/6	22/–	7	7	21/3xd.	—	6 11 9
G.E.C. :							
Pref.	31/9	26/3	6½	6½	27/6	—	4 14 6
Ord.	82/–	61/3	17½	20	75/–	—	5 4 4
Greenwood & Batley	27/6	22/6	7	15	22/6	—	13 6 8
Hall Telephone (10/–)	22/3	18/6	15	15	18/9	—	8 0 0
Henley's (5/–)	21/–	15/–	20	20	17/6	—	5 14 3
4½% Pref.	23/–	18/9	4½	4½	18/9	—	4 16 0
Hopkinsons	46/3	37/3	12½	15	42/6	+1/6	7 1 0
India-Rubber Pref.	21/3	18/9	5½	5½	20/–	—	5 10 0
Intl. Combustion	120/–	97/–	32½	32½	5½	+½	5 13 0
J. Lucas	60/–	45/–	15	15	56/3	+1/6	5 6 9
Johnson & Phillips	41/3	32/–	12½	12½	41/3	—	6 1 4
Lancashire Dynamo	72/–	50/–	25	25	56/3	+1/6	8 18 0
Laurence Scott (5/–)	12/–	9/6	15	15	9/6	—	7 18 4
London Elec. Wire	31/6	26/–	12	7½	26/3	—	5 14 4
Mather & Platt	50/–	39/–	13½	13½	45/–	—	6 0 0
Metropolitan Elec. Cable Pf.	21/3	21/–	5½	5½	21/3xd.	—	5 3 0
Murex	85/9	63/9	20	20	75/–	—	5 6 8
Pye Deferred (5/–)	13/9	7/6	25	25	7/6	—	16 13 4
Revo (10/–)	35/6	20/–	17½	17½	21/3	–7/6	8 4 9
Reyrolle	61/–	52/6	12½	12½	60/–	+½	4 3 4
Siemens Ord.	26/9	18/9	7½	7½	20/–	—	7 10 0
Strand Elec. (5/–)	5/6	2/–	10	4	2/–	—	8 0 0
S. Smith (1/–)	9/–	6/–	37½	50	7/6	—	6 13 4
Switchgear & Cowans (5/–)	15/–	10/–	20	20	11/3	—	8 18 0
Telegraph Condenser (10/–)	7/6	5/–	5	—	7/6	—	—
Telegraph Construction	2½	32/6	10	10	32/6	—	6 3 1
Telephone Mfg. (5/–)	10/–	7/–	9	9	8/–	—	5 12 6
Tube Investments	91/–	72/6	23¾	23¾	88/9	+1/6	5 8 0
Vactric (5/–)	4/3	2/3	4	Nil	2/3	—	—
Vickers (10/–)	24/6	14/6	10	10	16/6	—	6 1 3
Ward & Goldstone (5/–)	22/6	19/6	20	20	19/9	—	5 1 3
Westinghouse Brake	54/9	36/–	17½	17½	2½	—	7 15 6
Walsall Conduits (4/–)	31/9	21/3	55	55	25/–	—	8 16 0
West, Allen (5/–)	7/6	5/9	7½	10	5/9	—	8 14 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Australia.—BRISBANE.—January 15th. City Electric Light Co., Ltd. Two steam boilers and accessories. H. Baskerville, secretary, Boundary Street, Brisbane, Queensland.

February 14th. Nine automatic voltage regulators. (T. 29608/39.)*

February 22nd. 11-kV automatic reclosing switchgear. (T. 29937/39.)*

MELBOURNE.—January 8th. City Electricity Department. Twenty-two three-phase transformers. (T.Y. 29706/39.)*

Batley.—January 1st. Corporation. L.v. cables for twelve months. (See this issue.)

Birmingham.—January 10th. Salvage Department. Fifteen lead-plate batteries for electric vehicles. (See this issue.)

Erith.—January 1st. Electricity Department. Wiring of lighting and water heating points, and extension to fire alarm system at Bedonwell Hill School, Belvedere. (December 15th.)

Hucknall.—January 8th. U.D.C. Electrically driven pumping set at Salterford pumping station. Specifications from Rofe & Raffety, 42, Salisbury Avenue, Cheam (deposit £2 2s.).

Iran.—TEHRAN.—January 6th. Centrale Electrique de Tehran. Electrical plant, including turbo-alternators, high-voltage cable, transformers, &c. (T. 29037/39.)

Loughborough.—December 27th. Extension of switchboard annexe, Bridge Street generating station, for Town Council; W. Granger, borough surveyor, Town Hall (deposit £1 1s.).

Morecambe and Heysham.—January 5th. Electricity Department. Supply, jointing and pressure testing of e.h.v. cables. Excavating, laying and permanent reinstatement. (December 15th.)

Newport (Mon).—December 30th. Electricity Department. Supply of lamps for electrical installations under the assisted wiring scheme. Forms from A. Nichols Moore, borough electrical engineer, Electric House, Dock Street, Newport.

New Zealand. — WELLINGTON.—Public Works Department. January 16th. Two sets of 11,000-V metal-clad switchgear. (T. 28857/39.)*

January 23rd. Four 110 kV three-phase outdoor isolating switches. (T. 29122/39.)*

February 6th. Two motor driven centrifugal pumps. (T. 29120/39.)*

February 13th. Three single-phase transformer units. (T. 28146/39.)* Two 2,250-kVA three-phase boosting transformers. (T. 28144/39.)* Remote control equipment. (T. 28791/39.*

February 20th. Seven single-phase transformer units. (T. 28148/39.)* Four single-phase transformer units. (T. 28147/39.)*

February 27th. 22,000-V switchgear. (T. 28858/39.)* 11,000-V switchgear. (T. 28789/39.)*

March 12th. 110-kV outdoor switchgear and steelwork. (T. 28145/39.)*

March 26th. Four single-phase transformer units. (T. 28143/39.)*

South Africa.—CAPE TOWN.—January 15th. Electricity Department. Booster pumps, complete with driving motors, &c., and piping, two sets of motor starting and control gear, two 3,300-V iron-clad switchboards, two 380/220-V iron-clad distribution boards and one overhead travelling crane. (T. 27966/39.)*

January 17th. Automatic fire protection equipment. (T. 29487/39.)*

PAARL.—January 5th. Municipal Electricity Department. Transformers, automatic oil circuit-breakers and cable. (T.Y. 29956/39.)*

PRETORIA.—January 4th. Union Tender and Supplies Board. Telephone switchboards. (T. 29499/39.)*

DURBAN.—January 19th. General Stores Department. Electrically driven trenching machine. (T.Y. 29779/39.)* Overhead frogs and insulated crossing, &c. (T. 29780/39.)*

February 2nd. 6,600-V switchgear. (T. 29782/39.)

South Shields.—Installation of electrical apparatus to control all warning sirens in the borough (£1,000); J. Reid, borough engineer, Town Hall, South Shields.

Taunton.—December 22nd. Equipping small dwellings with electric lighting installations, for Electricity Department; L. V. Turner, borough electrical engineer.

Wolverhampton.—January 15th. Electrical Engineer's Department. E.h.v. switchgear. (December 15th.)

Orders Placed

Dartford.—Electricity Committee. Recommended. Wiring, for twelve months, under the assisted scheme.—W. J. Bayliss.

Exeter.—Electricity Committee. Accepted. Fire fighting equipment (£1,323).—Mather & Platt. Transformers: Three 500 kVA (£570).—Lindley Thompson Transformer Co.; two 300 kVA and two 150 kVA (£500).—Bonar Long.

Glasgow.—Transport Committee. Accepted. Dry cells.—Standard Telephones & Cables. Magnet coils.—Metropolitan-Vickers.

Police Committee. Accepted. Equipment for light therapy treatment for police officers.—Hanovia.

Electrical work at 30 police signal boxes (£127).—John Cunningham & Co.

Hastings.—Electricity Committee. Recommended. Switchgear (£704).—Ferguson, Pailin.

India. — Among contracts recently placed by the Indian Stores Department are the following:—Separators (Rs. 10,925).—Chloride Electrical Storage Co. (India), Ltd. Dynamo spares (Rs. 11,839).—J. Stone and Co. (India), Ltd. Electric lifts (Rs. 17,810).—Kaycee and Co. Ltd. Floodlights and spares (Rs. 19,792).—General Electric Co. (India), Ltd.

Ipswich.—Electricity Committee. Recommended. 110-ton and 12-ton electric

(*Continued on next page.*)

Water-power in Eire

ACCORDING to a paper recently read by Mr. O. J. Friel before the Dublin University Engineering Society the hydro-electric development scheme on the upper reaches of the River Liffey is to cost nearly £1,000,000 and water is likely to become available sooner than was expected.

It is a dual-purpose scheme, serving also to supplement the supply of potable water to the Dublin municipal area by way of a 60-mile aqueduct and ancillary intake works now being constructed by the City Corporation and its contractors. The principal features have been designed by the respective departments of the Eire Electricity Supply Board, whose contractor for the civil engineering work is the Francois Cementation Co., Ltd. Constructional features are described by Mr. V. D. Hartz in the November issue of *Concrete and Constructional Engineering*.

Two dams are being built with generating plant below each. The main reservoir will flood 5,600 acres, 55 residential holdings and 12 labourers' cottages. Reinforced concrete bridges are being built for the diversion of three main roads and precautions against contamination of the water have included the removal of 5,000 trees and many miles of hedges.

The Poulaphouca dam will impound the waters of the Liffey and King's rivers, providing 5,300 million cu. ft. of storage. It is of the straight gravity type, 104 ft. high and 225 ft. long, constructed in 45 ft. long blocks. Flood control will be by means of three crest gates, two of the vertical lift type while the centre one will have a hinged flap for the surface discharge of floating debris. The intake adjoins the dam; its debris rack will be cleaned by a machine operating from above. Float mechanism will prevent the main gate, which is 16 ft. wide and 20 ft. long and hydraulically operated, opening until the tunnel is full.

The pressure gallery is 1,230 ft. long, of 16 ft. internal diameter; part of it has been constructed by the open cut method and rock tunnelling for the remaining 900 ft. section is in progress. Excavation has been completed for the steel surge tank, 100 ft. high and 65 ft. 6 in. in diameter. Its concrete base forms the bifurcated top (containing two butterfly valves) of twin steel penstocks of 12 ft. diameter leading down to two vertical spindle turbines, each of 21,250 HP (15,000 kW) at a gross head of 154 ft. Together at full load they will pass 2,750 cusecs of water, and the resulting velocity in the pressure gallery will reach 13.6 ft. per second.

Generation will be at 10-kV, stepped up to 110 kV by main transformers at power station floor level, the outdoor substation being at surge tank level. Construction of the machine foundations has begun.

This plant will operate as a peak load station and fluctuations in the flow of the rivers will be equalised by the smaller Golden Falls plant 1.5 miles lower down. Work has commenced on this second site, just above the crest of a natural fall in the river; the intake in this case is to be within the dam itself, which is to be 50 ft. high and 320 ft. long. A short steel penstock will provide a head of 68 ft. for one vertical spindle Francis turbine (4,000 kW) while a 250 kW set will utilise, continuously if need be, the compensating discharge of 53 cu. ft. per second.

Staff quarters and a camp for 200 men have been provided, together with a laboratory for testing materials on site. The contractor operates his own gravel pit, situated one mile downstream, which is equipped with electrically driven machinery. A 10-kV transmission line from the national network supplies power to all the building sites.

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travelling cranes (£8,870, including a provisional sum of £300).—Ransomes and Rapier.

Sunderland. — Town Council. Accepted. Rewiring of the Municipal Hospital (£1,771).—F. Reid Ferens & Co., Ltd.

Workington.—Electricity Committee. Recommended. 200-kVA transformer.—British Electric Transformer Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Barnsley.—Rebuilding Grey Horse Inn, School Street; Hewitt Bros., Ltd.
Bakehouse, Warren Quarry Lane; Clarksons Old Brewery, Ltd.
Works extensions, Summer Lane; Reynolds Bros., Ltd.

Billingham-on-Tees.—Air raid shelter at the Billingham and Haverton Hill Maternity and Child Welfare Centre, for the Durham C.C.; county architect, 43, Old Elvet, Durham.

Blackpool.—Houses, Devonshire Road, for J. W. Lee, Ltd., Yarrow Road Saw Mills, Chorley.

Brighton.—Machine shops, Rock Place; Gill & Son, Ltd.

Caernarvonshire. — Council School, Bethesda; W. Lloyd Jones, county architect, County Offices, Shirehall Street, Caernarvon.

Carlisle.—Offices and flats, Chatsworth Square; H. Foxall.

Chelmsford.—Schools shelters (£9,500); borough surveyor.

Chester. — Warehouse, Northgate station; Elders & Fyffes, Ltd.
Extensions, Western Works; Rustproof Metal Window Co.

Chesterfield. — Church Hall, Lower Brampton, for the Derby Diocesan Board and Rev. E. Gardin, St. Mark's Road; C. E. Gaunt & Sons, contractors, West Bars, Chesterfield.

Chichester.—Houses for agricultural workers; R.D.C. surveyor.

Clacton-on-Sea.—Three-storey premises, for F. W. Llewellyn & Co., Ltd.; E. R. Nixon, architect, Lloyds Bank Chambers, West Avenue.

Coventry.—Houses, Pinley Fields and Charter estates, for the T.C.; A. F. Underhill, housing director, The Council House, Coventry.

Dartford.—Milk depôt, Watling Street; Dartford Co-operative Society, Ltd.

Dewsbury.—Fire station, Rishworth Road; borough surveyor.

East Ham.—Extension to factory, Boleyn Road; New London Electron Works, Ltd.

Felling-on-Tyne.—Public shelters and school shelters for the U.D.C.

Finningley (YORKSHIRE).—Parish hall; Rev. E. M. Milliken, rector.

Gateshead.—Hotel, Park Road, for James Deuchar, Ltd.; Hetherington and Wilson, architects, County Chambers, Westgate Road, Newcastle-on-Tyne.
Completion of housing schemes at Highfield and Blue Quarries, for the North-Eastern Housing Association, Metrovick House, Northumberland Road, Newcastle-on-Tyne.
Factory (F.99) on the Team Valley Estate, for North-Eastern Trading Estates, Ltd.; Tasker and Child, architects, Trinity Buildings, Newcastle-on-Tyne.
New premises, Hawks Road, for the Northern Butchers' Hide and Skin Co.; Arthur and Kirkup, architects, 13, Swinburne Street, Gateshead.
Generator house, for Clarke, Chapman and Co., Victoria Works.
Extensions to Fibreboard Boxes Co.'s factory at the North-Eastern Trading Estate; H. E. Pitt, Ltd., Leopold Street, Millfield, Sunderland.
Skin and hide depôt, for the Northern Butchers' Hide & Skin Co.; Arthur and Kirkup, Swinburne Street, Gateshead.

Glasgow.—Boiler house, Dalmarnock Paper Mills; Brown, Stewart & Co., Ltd.
Re-development St. Enoch Square area; Fraser Estates, Ltd.

Goole.—Eleven additional public shelters; borough surveyor.

Gravesend.—Additions to paper mills, Clifton Marine Parade; Imperial Paper Mills, Ltd.

Guildford.—Factory extensions, Stoke Road; R.D.F. Co., Ltd.

Guisborough.—Factory extensions for Blackett, Hutton and Co., Ltd., steel founders.

Hebburn-on-Tyne (CO. DURHAM).—Alterations and improvements to the Argyle Hotel, for Deuchar & Co.; Hetherington & Wilson, County Chambers, Newcastle-on-Tyne.

Hemel Hempstead.—First-aid station and air raid shelters, Apsley Mills; John Dickinson & Co., Ltd.
Offices, Felden Lane; J. W. Thompson & Co., Ltd.

Henley.—Adaptation of The Hermitage, Vicarage Road, for hospital accommodation; borough surveyor.

Hereford.—Alterations and additions to engineering works, Mortimer Road; Painter Bros., Ltd.
Houses, Manor Road; J. Hiles & Son.
Offices and flats, Bath Street; F. Lewis Smith.
Bus depôt extensions, Friar Street; Birmingham & Midland Bus Co., Ltd.

Higham Ferrers.—Additions to factory, Westfield Terrace; Ashford and Campion, Ltd., heel manufacturers.
Leather store, Westfield Street; F. D. Ward.

Hilsea (PORTSMOUTH). — Warehouse, London Road; Curtiss & Sons, Ltd., removers and storers.

Ilfracombe. — Pier reconstruction (£7,000); U.D.C. surveyor.

Kidderminster. — Offices, Exchange Street; Brintons, Ltd.

Lancaster.—Farm buildings and bungalows, Carr Lane, Middleton; H. S. Kamiya.
Admission hospital, site of Ridge Farm, for Lancashire Mental Hospitals Board.

Lichfield.—Factory in Greenhoughs Road, for John Harris (Coventry), Ltd.; J. R. Deacon, Ltd., contractors, Lombard Street, Lichfield.

Lincoln.—Extensions to County Hospital (£35,000), for Management Committee; Watkins and Coombes, architects, St. Edmonds Chambers, Silver Street.
A.R.P. scheme (£20,000); borough surveyor.

Litherland.—Public shelters on twelve sites; U.D.C. surveyor.

Liverpool.—Offices and works extension, Edwards Lane, for Beck Koller & Co., Ltd., Edwards Lane, Speke; W. Hall & Son, Ltd., contractors, 60, Christian Street, Liverpool, 3, and J. L. Rawsthorne & Co., Muirhead Avenue, Old Swan, Liverpool, 12.

London.—Alterations, Stafford Hotel, 16 and 17, St. James' Place, S.W.1.
Two-storey office and warehouse, Medina Works, Creekside; G. T. Harman, 90a, High Street, S.E.13.
Welfare centre, Lordship Lane, and health centre, Camberwell Road, Camberwell, for Borough Council Finance Committee; borough surveyor, Town Hall, Peckham Road, S.E.5.

Luton.—Extensions to maternity hospital, for T.C.; J. W. Tomlinson, architect, Town Hall.

Macclesfield.—Houses (104), for agricultural workers; J. H. Walters, R.D.C. surveyor, Moody Chambers, Congleton (electrical work).

Manchester.—Houses (49) for Greenwood & Tyson, Victoria Avenue, East Blackley; P. G. Kelvey, architect, 379, Moss Lane East.
Power house at works, Pottery Lane, Openshaw; G. & W. Smith (Builders), Ltd., Hyde Grove, Plymouth Grove, Longsight, Manchester, 12.

Merton.—Extensions to refuse disposal works, Garth Road, S.W., for U.D.C.; R. W. North, Dorset Hall, Kingston Road, S.W.19.

Morecambe.—Garage, site in Back Avondale Road; Messrs. Harrisons, Alexandra Road.

Morley.—Rebuilding Empire Cinema, Thorpe Road, East Ardsley, for Empire (East Ardsley), 1939, Ltd.
Extensions, Alexandra Mills; W. B. Stockwell.

Morpeth.—Shops and café, Bridge Street, for W. S. Sanderson, Bridge Street, Morpeth.

Newcastle-on-Tyne. — Decontamination station, Carliol Square, for the Newcastle and Gateshead Water Co.
Air raid shelters for the Northern General Transport Co., Ltd., Worswick Street; Northern Counties Institute for the Deaf and Dumb, Great North Road; Rutherford College Girls' School, Maple Street; Northern Counties School of Cookery, Northumberland Road; Newcastle Co-operative Society, Newgate Street; C.W.S., West Blandford Street; and F. W. Woolworth and Co., Ltd., Northumberland Street.
Garage for motor ambulances, at hospital; J. O. C. Solomon, city property surveyor, Town Hall, Newcastle.

Newport (I.O.W.).—Depôt extensions, Nine Acres; Stratton & Millgate.

Oldham (LANCS).—Structural alterations and improvements at the Victoria Cinema; A. Pellowe and Sons, contractors, Chamber Road, Oldham.

Orrell.—Methodist Church (£6,000); Rev. W. Swales, circuit minister.

Petworth. — Houses for agricultural workers; R.D.C. surveyor.

Poole.—Laundry accommodation, Alderney Isolation Hospital.

Reading.—Factory, Berkeley Avenue; George H. Gascoigne Co., Ltd.

Richmond-on-Thames.—Large air raid shelter, basement of Holy Trinity Vicarage, Princes Road, for E.C.; borough surveyor.

Rushden.—Additions to factory, Irchester Road, for Strong and Fisher.
Additions to factory, Allen Road, for P. Collins and Co.

Saddleworth. — Adaptation of High Grove Mill, Greenfield, as soap works; Oswald M. Cardell & Co., Ltd., Stretford.

St. Albans.—Hospital (£18,198); Jesse Mead, Ltd., Chesham.
Fire station, Redbourn; R.D.C. surveyor.

Sheffield.—Factory additions, Penistone Road, for Siskol Machines, Ltd., Penistone Road; H. J. Shepherd, architect, Town Hall Chambers, Fargate, Sheffield.
Workshops, warehouses and laboratory, Harvest Lane and Dutch Street, for Watson, Saville & Co., Ltd., Mowbray Street.
Alterations to works in Victoria Street; Ogden and Raine, architects, 63, Norfolk Street, Sheffield.
Works extensions, Manor Lane; J. Stead & Co., Ltd.
Works extensions, Limestone Cottage Lane; Batchelors' Peas, Ltd.

South Shields.—Cinema at Harding's Hill, for Black's Regal Theatres, Ltd., Sunderland.

Springfield (FIFE).—Erection of huts at the Asylum, for Fife and Kinross District Asylum Committee, Cupar.

Stafford.—Police depôt at Forebridge for the Staffordshire C.C.; F. & V. Linford, Ltd., contractors, Park Road, Cannock (£65,250).

Sunderland.—Air raid shelter, Warren Street, for Ditchburns, Ltd.; G. E. Matkin, architect, Fawcett Street, Sunderland.
Air raid shelter at the Technical College for the E.C. (£750).

Tarvin (CHESHIRE).—Houses (160), for agricultural workers; R.D.C. surveyor.

Thornaby-on-Tees.—Hotel for J. W. Cameron & Co.; J. C. Watson, Prudential Buildings, Stockton-on-Tees.

Thurrock.—A.R.P. depôt, Manor Road, Tilbury; U.D.C. surveyor, Whitehall Lane, Grays.

Uttoxeter.—Houses (58); R.D.C. surveyor.

Washington (CO. DURHAM).—Houses; T. L. Broome, Council Offices, Washington, architect.

West Hartlepool.—School air raid shelters; borough engineer.